

COWPOX.
OF
INOCULATION
ON THE
PRACTICAL OBSERVATIONS
OF
COWPOX.

PRACTICAL OBSERVATIONS
ON THE
INOCULATION
OF
COWPOX.

POINTING OUT A TEST OF A CONSTITUTIONAL AFFECTION IN THOSE CASES IN
WHICH THE LOCAL INFLAMMATION IS SLIGHT, AND IN WHICH NO FEVER IS
PERCEPTIBLE.

ILLUSTRATED BY CASES AND PLATES.

By JAMES BRYCE,
MEMBER OF THE ROYAL COLLEGE OF SURGEONS, EDINBURGH, SURGEON TO THE
ORPHAN HOSPITAL, AND ONE OF THE SURGEONS TO THE INSTITUTION
FOR THE GRATUITOUS INOCULATION OF COWPOX.

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PRACTICAL OBSERVATIONS

ON THE

INDUCTION OF
PRACTICAL OBSERVATIONS

OF

TECHNIQUE OF PRACTICE

C. O. W. P. O. X.

THE PRACTICE OF PRACTICE

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THE PRACTICE OF PRACTICE

TO

DANIEL RUTHERFORD, M. D.

PROFESSOR OF BOTANY;

THE FOLLOWING PAGES ARE INSCRIBED,

IN TESTIMONY OF

THE HIGHEST RESPECT,

AND

THE MOST SINCERE ESTEEM,

BY

THE AUTHOR.

THE HON. LORD MEADOWBANK,

THE REV. DR. BAIRD,

DOCTOR ALEXANDER MONRO, SEN.

ALEXANDER WOOD, ESQ.

JOHN WAUCHOPE, ESQ.

Directors of the Institution for the Gratuitous Inoculation of Cowpox, Established at the Public Dispensary of Edinburgh in February 1801.

GENTLEMEN,

THE INSTITUTION for the GRATUITOUS INOCULATION of Cowpox, of which you are the Guardians, is allowed to be one of great national importance; and the regulations by which it is conducted are such as reflect honour on you, and on those of the Public who are its Supporters. Already have upwards of six hundred persons been rendered

rendered secure against a disease, the most loathsome, pestilential, and dangerous to which human nature is subject; and reckoning according to the general mortality from smallpox in large cities, at least one hundred lives have been preserved to their Friends and to Society.

WHILE in other Institutions of a similar nature, the advantages resulting, are confined to those who are recommended by the Directors and the Subscribers, in yours the benefits are extended equally to all who apply; nor is it the poorer classes alone to whom this Institution is beneficial; the more wealthy throughout Scotland also partake of its advantages: For, from the Institution, the GENUINE Cowpox Virus is forwarded, almost daily, to Medical Practitioners in every direction; the obtaining of which is a circumstance of the very first importance, to ensure success from the Inoculation of Cowpox.

WHEN you, Gentlemen, did me the Honour to appoint me, along with Dr Farquharson, to inoculate

oculate at your Institution, I entered upon my public duty with an anxious wish to discharge it in a manner suited to the importance of the trust, and the greatness of the object which you had in view. An essential part of that duty I considered to consist in making such observations, on conducting the Inoculation of Cowpox, as might tend to elucidate farther that interesting subject; and having made such as it is thought may be useful for that purpose, I now make them public, in the hope that the advantages of the Discovery itself may thereby be more rapidly and extensively diffused.—May that hope not be disappointed!

I am, Gentlemen,

Your most obedient servant,

JAMES BRYCE.

ST ANDREWS SQUARE, }
 April 26. 1802. }

CONTENTS.

CHAP. I.

GENERAL HISTORY OF THE COWPOX.

SECT. I.

	Page.
Of the Rise and Progress of Inoculation for the Cowpox,	I

SECT. II.

Of the Origin of Cowpox,	14
--------------------------	----

SECT. III.

Description of the Cowpox,	25
----------------------------	----

SECT. IV.

Of Varieties which sometimes occur in the course of Cowpox,	36
--	----

CHAP.

C H A P. II.

OF THE ADVANTAGES WHICH WILL RESULT
TO SOCIETY FROM THE GENERAL PRAC-
TICE OF INOCULATION FOR THE COW-
POX.

S E C T. I.

The Cowpox is greatly milder than the Smallpox, 59

S E C T. II.

The Cowpox gives security to the Human Con-
stitution against the Smallpox,

S E C T. III.

The Cowpox is not Contagious, 80

C H A P. III.

OF CIRCUMSTANCES TO BE CAREFULLY AT-
TENDED TO BY THOSE CONDUCTING THE
INOCULATION OF COWPOX, THAT SOCIE-

CONTENTS.

xiii

TY MAY REAP ALL THE ADVANTAGES
WHICH CAN RESULT FROM THAT OPERA-
TION.

S E C T. I.

Of the Distinguishing Marks of Cowpox, - 87

S E C T. II.

Of the State of the Person to be Inoculated 103

S E C T. III.

Of the Virus to be used for Inoculation.

—Period at which the Virus is most active—

Manner of obtaining the Virus—Different

Modes of preserving the Virus—A NEW MODE

of obtaining and preserving the Virus, - 114

S E C T. IV.

Of the Different Modes of inserting the Virus, 137

S E C T. V.

Of the regular Progress of the Local and Con-
stitutional Affections of Cowpox.

—Appearances

<i>—Appearances of the Local Affection described at four different periods—These have hitherto formed the only criterion whereby to judge of a Constitutional Affection—This criterion frequently erroneous—Instances—A Proper Test of a Constitutional Affection A DESIDERATUM—Some unsuccessful Attempts made to obtain a proper Test—A Test discovered which is found to be effectual—Cases and Plates illustrative of this Test</i>	146
---	-----

C H A P. IV.

OF THE MEDICAL TREATMENT OF COWPOX, 222

DIRECTIONS TO THE BINDER.

Place the Plates immediately after page 221.

PRACTICAL

PRACTICAL OBSERVATIONS

ON

C O W P O X.

C H A P. I.

GENERAL HISTORY OF THE COWPOX.

S E C T. I.

*Of the Origin and Progress of Inoculation for the
Cowpox.*

THE Cowpox is an ailment which is readily communicated, by inoculation, from the cow to the human subject, or from one human subject to another under certain conditions; and, from all that has hitherto appeared, gives security to those who have undergone its full operation against one of the most loathsome and fatal diseases to which mankind are liable—the Smallpox.

A

The

The history of the introduction of this new species of inoculation into medical practice, as a preventive of smallpox, is curious; and an accurate account of all the appearances produced, and of the effects operated upon the human constitution by this singular ailment, must be highly interesting and important.

It had been an observation long made in several of the dairies in England, particularly in those in Gloucestershire, that the milch-cows were frequently affected with an eruption upon their udders and teats, which was communicated not only from one cow to another, but frequently also to the hands of the milkers; and farther, that such of the milkers as had been thus affected, were never afterwards infected with smallpox, either by inoculation, or by exposure to the most virulent contagion of that disease, even although such persons had not previously undergone that dreadful malady.

It

It is curious that the knowledge of a fact of so singular a nature, and one of so much importance to the general interests of society, should have been, from time immemorial, confined almost entirely to those occupied in the business of dairies, without being fully investigated by such persons as could duly appreciate its value.

Dr Jenner, a physician in Berkley, in Gloucestershire, was the first person who set himself about examining this subject with that care and attention which its importance seemed to demand.

In the year 1798, after much diligent labour and investigation, Dr Jenner published “An Inquiry into the causes and effects of the *Variolæ Vaccinæ*,” in which he gave such an account of this most singular ailment, for it really is of so mild a nature as not to deserve the name of disease, as soon attracted the attention of, and astonished, the whole medical world. For a considerable time, the accuracy
of

of this account was received among medical men with hesitation. The character, however, of Dr Jenner, and the singularity and important nature of the ailment, led, as may easily be supposed, to farther investigation; and although many arguments were urged, and circumstances stated which seemed adverse to the plan of the general introduction of cowpox among mankind, yet the great utility of it at last was clearly evinced; and these investigations tended ultimately to confirm the observations of the accurate Jenner, and to establish the credit of this ailment, as a preventive of smallpox, on a basis too firm to be shaken by the shafts of envy, malice, or ignorance, the basis of immutable truth.

Dr Jenner, not satisfied with the assertions of the dairy farmers and servants, that persons who had been affected with cowpox were rendered thereby secure against the attack of smallpox, determined to ascertain the truth of this fact by the test of experiment;

experiment: He inoculated for smallpox many persons who had formerly undergone the cowpox, some so long as thirty and even fifty years before; and these he uniformly found, as had been predicted to him, completely to resist that disease.

So far the nature of cowpox was known to others before it was known to Dr Jenner. In the year 1796, however, this ingenious gentleman pushed his investigation farther; and, on the 14th of May, he first intentionally infected the human constitution with the virus of cowpox, by inoculation, with the design, as he informs us, of observing more accurately the progress of the affection. The experiment succeeded; and the affection, though remarkably slight, was clearly marked in all its stages.

Dr Jenner next conceived the idea of inoculating this person with the virus of smallpox, in order to ascertain whether so slight an affection, as had taken place from cowpox, could possibly
give

give security from that dreadful disease. Several slight punctures and incisions were accordingly made in both arms, and the virus (of smallpox) was carefully inserted, but no disease followed. Some months afterwards the same person was again inoculated for smallpox, but still no sensible effect was produced upon the constitution.

This is to be reckoned the first discovery of the ingenious Jenner, respecting the nature of cowpox, viz. that the matter of cowpox, taken from the pustules on the cow, and artificially inserted into the human subject, produces an affection which, at the same time that it is more mild in its symptoms than that produced by accidental infection, does nevertheless still operate such a change upon the constitution as to render the person infected unsusceptible of smallpox.

Here the farther experiments of Dr Jenner, by want of matter to be employed in the prosecution of them, were prevented until the spring of the
year

year 1798, at which time the cowpox became again prevalent among the cows of the dairies in his neighbourhood, and afforded him an opportunity of investigating farther this interesting subject.

With matter taken from cowpox pustules on the teats of a cow, Dr Jenner now inoculated several persons; and from these persons he propagated the affection, also by inoculation, to others, even so far as the fifth change, without recurring to the original source, the pustules on the teats of the cow. The experiments were compleatly successful. The affection, in all those inoculated, was regularly produced. All the persons that had been thus infected were afterwards subjected to inoculation with the virus of smallpox, but ineffectually, no disease in any instance succeeding to this operation. The following is the report of Mr Henry Jenner to Dr Jenner on this important point. ‘I have inoculated, ‘ for smallpox, Pead and Barge, two of the boys ‘ whom you lately infected with cowpox. On the ‘ second day, the incisions were inflamed; and there
‘ was

‘ was a pale inflammatory stain around them. On
 ‘ the third day, these appearances were still increas-
 ‘ ing, and their arms itched considerably. On the
 ‘ fourth day, the inflammation was evidently sub-
 ‘ siding; and, on the sixth, it was scarcely percep-
 ‘ tible; no symptom of indisposition followed *.’

From these experiments, we derive another most important discovery concerning the nature of cowpox, viz. that the virus of cowpox may be propagated from one human subject to another, through several gradations, and still retain the power not only of producing the affection regular in all its stages, but also of rendering those constitutions which are infected secure against the attacks of smallpox.

By unwearied attention to all the circumstances under which he was accustomed to observe this ailment, Dr Jenner was led to conclude,

That

* Jenner's Inquiry, p. 43.

That persons who have already had the smallpox are still susceptible of the action of cowpox, though not to such a degree, as those who have never been subjected to that of smallpox.

That in cowpox, no eruption takes place unless on the part where the virus is applied to the skin.

That cowpox, even under the most unfavourable circumstances, has never proved fatal.

That cowpox cannot be propagated by contagion, but only by actual contact, or inoculation, with the virus.

That the virus of cowpox inserted into the human body may produce an affection which is merely local, the general constitution remaining unaltered, and that in such cases the person is still liable to be infected with the smallpox.

Soon after Dr Jenner's publication appeared, viz. in November 1798, Dr Pearson of London published "An Inquiry into the history of cowpox, principally with a view to supersede and extinguish the smallpox." In this treatise, the positions and conclusions of Dr Jenner are examined with that candour and attention which their importance demand. The evidences adduced are numerous and respectable, and the result is highly favourable to the general introduction of inoculation for cowpox among mankind, not only as a preventive of smallpox, but also as a certain mode of ultimately extinguishing that loathsome malady.

In May 1799 were published, "Reports concerning a series of inoculations for cowpox, with remarks and observations on this disease considered as a substitute for smallpox, by Dr Woodville physician to the smallpox and inoculation hospital in London." The account here given by Dr Woodville is very different from that given by Dr Jenner, and by no means favourable to the gene-

ral introduction of the new inoculation as a substitute for smallpox. Such a report, coming from a man of Dr Woodville's known character and reputation as an accurate observer, naturally produced a strong sensation on the minds of medical men concerning the discoveries of Dr Jenner. The circumstances, however, under which Dr Woodville's observations were made, and upon which his reports were founded, were such as led him to be much deceived concerning the true nature of cowpox. As this will be clearly pointed out in the following pages, I shall at present avoid entering into the particulars.

This report of Dr Woodville, so very different from the general statement of Dr Jenner, naturally called for a reply from the latter, who accordingly, in 1800, published, "A continuation of facts and observations relative to the Variolæ Vaccinæ." In this publication, Dr Jenner is anxious to recover his favourite subject from that degree of shade which had been thrown upon it by the hasty reports

reports of Dr Woodville; and this he appears to have done with great success, both by farther observations of his own, and by the concurring evidence of many respectable correspondents.

In the mean time the practice of inoculation for cowpox gradually became more general; and it is a strong proof of the accuracy of Dr Jenner's opinions concerning this ailment, and of its superiority over smallpox, that the more it was practised, and the more narrowly all the facts concerning it were observed, in so much the more was it preferred, as certainly productive of all the advantages which had been described.

In order that the poorer class of mankind might reap equal advantages from this important discovery, as the more rich, and that all ranks might have an opportunity of co-operating for the general good of society in accelerating the extermination of smallpox, public institutions were soon established in most of the great cities in England, where gra-
tuitous

tuitous inoculation for cowpox was to be performed to all those who should apply. Charitable institutions of the same kind have also been established in many of the towns in Scotland; and in all these the success of the new inoculation has been such as to equal the most sanguine expectations of the discoverer. Nor is it to the inhabitants of Britain alone, that the advantages arising from the inoculation of cowpox are confined; in the sister kingdom it has also been practised with equal success; from France likewise, from Germany, Holland, America, the West Indies, &c. &c. reports are daily arriving, proclaiming the efficacy of cowpox as a sure preventive of smallpox, and pronouncing blessings on the head of the thrice happy Jenner.

Of the Origin of Cowpox.

SOME have asserted, that the cowpox is not generated in the constitution of the cow, but produced on her by inoculation with certain diseased fluids of the horse; while others are of opinion that this ailment is truly vaccine, being generated solely in the constitution of the cow: Of the former opinion is Dr Jenner.

The horse, it is well known, is subject to an inflammation and swelling in the heels, which is called the grease, from which, at a certain period of
the

the affection, there issues a very acrid thin matter ; and this applied to the udder or teats of the cows, Dr Jenner supposes, gives rise to a pustular affection on those parts, which is the cowpox.

The matter issuing from the heels of the horse under grease, is supposed to be conveyed to the udder and teats of the cows, in the dairy farms, by the men servants, who there generally assist in milking : Thus, one of these, having previously dressed the heels of the horse, goes immediately to bear his part in milking ; and, having some particles of the discharge from the grease upon his hands, applies it to the udder and teats of the cow, where, if the animal be in a proper state for receiving the infection, it produces a particular action in the parts, giving rise to those vesicles which constitute cowpox. Dr Jenner grounds this opinion upon a general observation among those employed in dairies, viz. that the cowpox affection among the cows is always observed subsequent to the prevalence of the grease among the horses.

Against

Against this opinion of Dr Jenner concerning the origin of cowpox, it is argued, that experiments have been made by Dr Woodville and by Mr Coleman with much care and attention, in order to produce cowpox, by directly inoculating the udders and teats of cows with the recent matter of grease from the horse, but that, in no instance, have they been successful.

Again, it has been found by Dr Pearson, that the cowpox has broken out on a farm where no infected cows had been introduced among the herd, and where the milkers had not been liable to have their hands infected by the matter from the heels of horses under grease, nay, where there were no horses kept upon the farm.

Doctor Woodville has also inoculated human subjects with the recent matter of grease from the heels of the horse, but could not by this means produce cowpox.

Those

Those who have thus argued against the opinion of Dr Jenner, have attributed the origin of cowpox to certain unknown changes in the constitution of the cow, owing probably to the season of the year, or to a change from a less to a more nutritious diet, as happens in the spring season.

Adverse as these things may appear to the opinion entertained by Dr Jenner concerning the origin of the cowpox, more late observations seem to declare in his favour, and to confirm his position, that the cowpox is actually produced in the cow from inoculation with diseased fluids of the horse.

In the Medical Journal for November 1800, is a letter from Sir Christopher Pegge, from which it appears that there is a disease affecting horses which is considerably different from, but which, however, may have been confounded with, the grease. This disease is called by farriers *Scratchy-beel*; and Sir Christopher observes, on the authority of Mr Lupton surgeon at Thame, that the matter thence issuing,

on being applied to several persons, had produced in them a disease every way similar in appearance to the cowpox ; also, that this matter from the horse had produced the disease on the cow, and from her again it had been regularly communicated to several persons. At the time this letter was written, however, it does not appear that any of the persons thus infected had been subjected to inoculation for smallpox, so that it was merely the appearance of the affection that Sir Christopher and Mr Lupton trusted to in their observations.

In October 1801, Dr Loy, physician at Aislaby, published an account of some experiments conducted by him, in order to ascertain the true origin of the cowpox affection on the cow. These experiments appear to me to have been conducted with judgment and with attention ; and I am not at present aware of any reason why they should not be regarded as conclusive on this point. Doctor Loy informs us, that he had made several unsuccessful attempts to produce any appearances of cowpox,

either

either upon the cow or upon the human subject, by the application of greafe-matter as obtained directly from the heels of the horfe ; “ at length,” adds he, “ I had the good fortune to meet with one horfe, from whose heels I procured the matter of greafe in a more limpid state than that obtained from any of the others, at about the fourteenth day of the difeafe, and a week from the first appearance of the difcharge. The matter from this horfe produced the difeafe in Experiments IV. and VI. and also in three cows, whose cafes I have not particularized, as the appearances were fimilar to experiment IV. and as no farther trials were made from them.”

The following are fome of the experiments of Dr Loy on this important point.

EXPERIMENT IV.

“ Some of the thin limpid matter that iffued from a fore in the heel of a horfe affected with the greafe,
was

was inserted, by a perfectly clean lancet, immediately after its being procured, into the teat of a cow. On the fifth day, the wound appeared rather elevated, and a faintish redness surrounded it. In a few days, a vesicle formed, containing a large quantity of watery fluid, and of a purple tinge. Though the inoculated part was tumified and painful, the animal did not seem otherwise diseased."

EXPERIMENT V.

"A quantity of limpid matter, obtained from the teat of this cow, was inserted into the arm of a child. On the third and fourth days, the incision appeared without any evident signs of having received the infection; but, on the sixth day, a considerable degree of redness surrounded the wound, and a vesicle was formed on the ninth day, when the child was inoculated with the smallpox virus in different places, and in such a manner that there could not be the least doubt of communicating the infection,

infection, was the constitution capable of receiving it. The child, however, continued free from any topical or general symptoms of the smallpox."

EXPERIMENT VI.

"Some grease-matter, obtained from the same horse, was inserted into the arm of a child. On the third day, a small degree of inflammation surrounded the wound. On the fourth, the inoculated part was much elevated, and a vesicle of a purple colour was formed on the fifth day. On the sixth and seventh, the vesicle increased, and the inflammation extended and became of a deeper colour. On the same day a chilliness came on, attended with nausea and some vomiting. These were soon succeeded by increased heat, pain in the head, and a frequency of breathing: the pulse was very frequent, and the tongue was covered with a white crust. When in bed, the child was much disposed to sweat. By the use of some medicines,

and

and exposure to cool air, the feverish symptoms soon abated, and disappeared entirely on the ninth day. On the sixth day, smallpox matter was inserted into the same arm in which the matter of grease had been placed, but at a considerable distance from it. On the fourth and fifth days of the smallpox inoculation some redness appeared about the wound; and on the sixth, a small vesicle. The inflammation now decreased; and, on the ninth day, the vesicle was converted into a scab."

EXPERIMENT VII.

" On the sixth day of inoculation, and previous to the insertion of the smallpox virus, matter was procured from this child, and five others were inoculated with it. From the remoteness of the situation, I had not an opportunity of seeing them until the tenth day of the inoculation; on that day, an extensive erysipelatous efflorescence surrounded the vesicles which were now beginning to dry, but
still

still contained a considerable quantity of limpid matter. On the tenth day, they were all inoculated for the smallpox in the arms free from the former inoculation. Nothing appeared from the insertion of the variolous matter except a very small degree of inflammation, which vanished on the fifth day."

These experiments afford us new cause for admiring the accuracy of Dr Jenner's investigations: From them, and the farther observations of Dr Loy, we are led to conclude,

1. That there are two kinds of grease, as affecting horses, differing much from each other in the power of giving disease to the human or brute animal.
2. That one of these is a general as well as a topical disease, being evidently attended with fever, and, at a certain period, with an eruption upon
the

the skin; while the other is merely a local affection.

3. That it is the matter issuing from the heels of the horse affected with the former of these kinds of grease only, at a certain period of the affection, and while in a limpid state, that possesses the power of communicating disease to the human constitution, or that of brute animals.
4. That the disease thus communicated, whether by direct inoculation with the matter of the grease as issuing from the horse, or after it has been regenerated in the constitution of the cow, secures the person who has been infected from all future attacks of smallpox:—In short, that this is the Cowpox.

S E C T. III.

Description of the Cowpox.

THE cowpox, when produced in one cow, is observed to spread with considerable rapidity among the herd, not by means of contagious effluvia, but by the matter of the vesicles being carried from one cow to another by means of the milkers. This singular affection makes its appearance generally in the spring season; and is observed upon the udders and teats of the cows, at first in the form of small vesicles containing a limpid fluid. These vesicles are of a bluish or livid colour, and are fur-

D rounded

ounded with considerable swelling and inflammation, seemingly of an erysipelatous nature. By degrees, the vesicles become irregular about the edges, and, unless care is then taken, are very apt to degenerate into foul and troublesome sores: During this course of the affection, the cow is frequently observed to be considerably disordered, the appetite is impaired, she is found to be hot, and the secretion of milk is considerably diminished. It is observed that cows may be frequently affected with this disease; but the first attack of it is always the most severe. The farriers and cow-doctors cure the foul ulcerations, into which these vesicles often degenerate, by the application of strong escharotics.

The matter issuing from the vesicles upon the udders or teats of the cows, when it falls upon the hands of the milkers, and more especially if the cuticle happen to be abraded at the part on which it may chance to lodge, very certainly infects those milkers. When the ailment is communicated
in

In this way, it is called the casual cowpox, by way of distinguishing it from another mode by which it is now intentionally propagated among mankind, viz. inoculation; and it is observed, that the affection is always more severe when it takes place by the former mode, than when communicated by the latter. This difference, however, may most probably be owing to the greater number of vesicles which generally appear in the casual cowpox, from the virus having been applied more extensively, or to a greater number of distinct points on the surface of the body, than in the inoculated cowpox: For on each of these points will be formed a vesicle; and this greater number of vesicles will of course produce not only a greater degree of pain, swelling, and inflammation of the affected member, but most likely also a greater degree of fever will follow than where one or two vesicles only are formed, as in the case of inoculated cowpox.

The

The local situation of the pustules may also have considerable influence in producing a more severe affection. This will be allowed, when we consider, that inflammation affecting tendinous parts, as about the hands, is more painful, and also more apt to degenerate into foul sores, than where it is confined to the softer skin and cellular membrane.

When the cowpox has been communicated to the milkers in the casual way, small inflamed spots appear in a few days upon the hands, more particularly about the joints and tips of the fingers. These spots quickly assume the appearance of small blisters, somewhat resembling those from burns, which go on increasing until they become large vesicles of a circular form, with a flat or rather a concave surface, their edges being considerably elevated above their centre. They have now acquired a bluish colour, nearly, but not exactly, resembling those upon the cow, and are found to contain a limpid fluid. After some days, the parts around the base of these vesicles become considerably swelled,

ed, hard, and inflamed, and, as the affection advances, assume much of an erysipelatous appearance. Pain and some degree of swelling of the glands in the armpits now denote an absorption of the virus; and the usual symptoms of fever supervening, mark a constitutional affection, which is sometimes so severe as to incapacitate the person from following his usual employment for some days. It does not however appear, that ever, even in the smartest attack from the casual cowpox, any eruption on the surface of the body succeeds to the general or constitutional affection.

After a few days, the pain, inflammation, and hardness of the surrounding parts gradually abate; but the vesicles, in place of drying up kindly, very frequently, as before remarked, run into foul and troublesome ulcerations. These ulcerations, however, are generally cured without occasioning any lasting injury; and the constitutional affection, although severe, is always transient and unattended

tended with danger, there being no instance on record where this has been known to prove fatal.

To those employed in dairies, it is well known that the same person is liable to repeated attacks of the casual cowpox, but the succeeding attacks are always flighter than the first. It is also known, that a person having undergone smallpox does not thereby become exempt from the action of the virus of cowpox; in such cases, however, if the ailment be produced, it is also a more flight, and perhaps merely a local, affection.

In the cowpox, as induced by inoculation, there are some appearances which are considerably different from those which have been described above, as occurring in the casual disease; and as it is highly probable that it is under this form in which cowpox will chiefly become the object of medical practice, we shall now proceed to consider more particularly the progress of that affection when propagated by inoculation.

About

About the third day after the insertion of the virus of cowpox, either by puncture or by slight incision in the arm, a small inflamed spot may be observed in the part where the inoculation was performed; Next day, this spot appears still more florid, especially if the person be warm; and by passing the point of the finger over it, a degree of hardness and swelling in the part is readily perceived. On the fifth day, a small pale vesicle occupies the spot where the inflammation was, and the affection begins to assume the characteristic appearance of cowpox. In place of inflammation, extending around the base of the vesicle, at this period, as is common in smallpox and most other pustular diseases, the whole has a milky white appearance. The vesicle is now turgid, but evidently depressed in the centre, while the edges are considerably elevated. For the next two days the vesicle increases in size, and retains the same character, so that by the seventh it has acquired very considerable magnitude, and is of a circular form if the inoculation was performed by a puncture, or of an oblong form if done by an incision;

cision ; but in both cases the margin is regular and well defined, while the centre, becoming still more depressed, and a small crust forming there, and the edges becoming more turgid, give the whole a very particular appearance and character, which, in my opinion, may readily serve to distinguish this affection from every other.

The structure of this vesicle, as may be perceived at this period, is singular, and very different from the structure of the pustule which occurs in smallpox. In smallpox, the whole fluid of the pustule is contained in one entire or undivided cavity, and may be all readily evacuated by one small puncture. In cowpox, however, it is very different, for here the vesicle is greatly subdivided, or is composed of many cells, the whole somewhat resembling a honeycomb, with a general covering from the cuticle.

About the eighth day from the time of inoculation, inflammation begins to appear around the base of the vesicle. This increases for two or perhaps
three

three days more; and, when at the height, the inflamed part is quite circular, and from half an inch to two inches or more in diameter. This inflamed circle, or areola, acquires an erysipelatous brightness, and the whole, more especially the part contiguous to the vesicle, feels very hard and tense. At this period also, the vesicle still retains the concave appearance, the crust in the centre has considerably increased in size, and begins to assume a dark or brownish colour, while the turgid edge assumes more of a shining appearance, as if the contained fluid was passing into a purulent state. About the eleventh day, the vesicle has attained its greatest magnitude, and then the surrounding inflammation and hardness begin to abate: and it is curious to observe, when this takes place, that the redness generally disappears first from the neighbourhood of the vesicle, and thence gradually towards the edge of the areola, often leaving at the last a complete but slender florid ring or circle of inflammation, marking the circumference of the faded areola, the inner part having changed to a dingy
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yellow.

yellow. The fluid in the vesicle, which was before very thin and transparent, is now more viscid and slightly turbid, and, after this period, the whole is quickly converted into a smooth, shining, and somewhat transparent dry crust, of a dark brownish or red colour. This crust, unless forcibly removed, will remain upon the part for one or sometimes two weeks, and then fall off, leaving the parts underneath quite sound and entire.

This, then, is the general course of the affection as it appears at the part inoculated; and, in the greater number of instances, especially in children infected with this ailment, little more is to be remarked: in some, however, and particularly in adults, marks of a constitutional affection are common.

About the eighth day from the time of inoculation, the glands in the axilla become a little swelled, occasioning pain and stiffness on moving the arm. Headach, shiverings, a frequent pulse, and
other

other febrile symptoms take place ; and these have been observed to continue from a few hours to two or more days. These symptoms, however, are in general so slight and transient as to require no aid from medicine.

S E C T.

S E C T. IV.

*Of Varieties which sometimes occur in the course of
Cowpox.*

HAVING mentioned the usual course of the phenomena as they appear in cowpox; it is now to be observed, that considerable variations from this course occasionally take place, which, however, make no real difference in the nature of the ailment. Thus, the vesicles and circles of inflammation, in some cases, attain to their full height two days sooner or later than the period above mentioned. Also, if the vesicles have been broken,

broken, or the crusts forcibly removed, about the tenth day, an ichorous matter is poured out, and will continue to be discharged for some time; or a scaly matter may be formed over the sore, whereby it will be prevented from healing for a very considerable time. Sometimes also the sore, after this period, is apt to degenerate into a foul and troublesome ulcer.

A copious eruption of very small pimples is frequently observed upon the inoculated arm, about the third day after the operation. These always subside or vanish spontaneously in a day or two; and this appearance is so far from being alarming, that I am always well pleased to observe it, regarding it as a certain sign of the infection having taken place. This eruption I have generally observed to be most abundant on the fore arm; and I suppose with others that it must be attributed merely to the effect of local irritation.

Another,

Another, and a very important circumstance, has been described by many as a variety occurring in cowpox ; I mean, an eruption more or less plentiful of well defined pustules over the whole body, which are said to run their course regularly, and become filled with a fluid which possesses the property of producing a similar disease by inoculation. But as an eruption of pustules, in consequence of the constitutional affection of cowpox, does not always take place, and is not necessary, according to the observations of Dr Jenner, to secure the person infected from the future attacks of smallpox; and as the cowpox has, according to the opinion of Dr Woodville and some others, been, from the presence of these, converted into a severe disease, it becomes a point of much consequence to investigate the nature of these eruptions, in order that, if they are found really to belong to cowpox, their cause may be avoided.

It must be allowed that there is scarcely any person, who has had much practice in the cowpox inoculation,

culation, who has not met with cases where an eruption, of pustules, more or less numerous, has taken place during the course of the affection; and much has been said and written concerning the nature of these. Some, from observing this supposed variety of cowpox, have reprobated the introduction of such a disease among mankind, as one fully as severe as that which it was meant to prevent; while others contend, that these eruptions are altogether foreign to the cowpox, and owing entirely to accidental circumstances in no way connected with that affection. That this is really the case will, I apprehend, clearly appear from an attentive consideration of the following pages.

We are told that a great many of the persons who were first inoculated by Dr Woodville for cowpox, were affected with eruptions so numerous, and which ran a course so similar to the pustules of smallpox, that, as he informs us, "he could not discriminate between them;" and it was in consequence of this, that his report formerly alluded

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ed to, which had been drawn up from these cases, was so adverse to the introduction of cowpox inoculation among mankind as a preventive of small-pox. I shall state Dr Woodville's own words on this point; and then make such remarks on his report as my own experience and that of others suggest, in order to detect the source of his deception, and to determine what ought justly to be concluded from his experiments respecting the true nature of these varioliform eruptions.

Dr Woodville, in his reports on cowpox, has given a table showing how many persons out of the number he inoculated had pustules, and the number of pustules which appeared upon each individual.— From this table we learn, that 500 were inoculated, a very great majority of whom had pustules, and that, in many, the number of these amounted to about one thousand.

“ This table,” he observes, “ contains a sufficient number of cases to enable the medical reader

to form a tolerably correct judgment respecting the disease; and, from considering what would probably have been the effects of an equal number of cases of variolous inoculation, he may draw his own conclusions. But before this is done, I have to observe that, since the table was composed, one infant, on the breast, died on the eleventh day after the matter of cowpox had been inserted in its arm. In this solitary instance, the local tumor was very inconsiderable, and the eruptive symptoms took place on the seventh day, when the child was attacked with fits of the spasmodic kind, which recurred at short intervals with increased violence, and carried it off at the time above mentioned, after an eruption of 80 or 100 pustules."

"It appears, therefore, that out of five hundred cases of inoculated cowpox, one proved fatal; and the preceding table shows, that in some others the disease, *from the number of pustules*, was of formidable severity; while, on the other hand, a very large proportion of the patients were scarcely

disordered from the inoculation, and had no pustules.”

“ Were I enabled,” continues he, “ to state a number of cases of variolous inoculation, equal to those given above, and reduced to a similar tabular form, the comparative magnitude of the two diseases might be estimated with tolerable precision. It is evident, however, that the matter of the vaccine disease has generally produced much fewer pustules and less indisposition than that of small-pox ; for it appears, from the preceding statement, that about two-fifths of all the persons inoculated for the *variolæ vaccinæ* had no pustules, and that in not more than a fourth part of them was there experienced any perceptible disorder of the constitution.”

“ But, it must be acknowledged, that in several instances the cowpox has proved a very severe disease ; in three or four cases out of five hundred, the patient has been in considerable danger, and one
child,

child, as I already observed, actually died under the effect of the disease. Now, if it be admitted that at an average one in five hundred will die of the inoculated cowpox, I should not be disposed to introduce this disease into the inoculation hospital, because, out of the last five thousand cases of variolous inoculation, the number of deaths has not exceeded one in six hundred. But, adds he, “ I am inclined to think, that if the matter of cowpox used for inoculation was only taken from those in whom the disease appeared in a very mild form, the result would be more favourable than in the statement here given ; for, though it has occasionally happened, that the matter taken from the arm of a patient, in whom the disorder neither produced fever nor eruption, has in others produced both, yet still it has much more commonly had the effect of exciting a more mild disease than the matter of the pustules, or than that which was obtained from a patient who had the disease in a severe manner, as may be seen by an examination of the table. Thus, we find, that out of sixty-two persons

sons

sons who were inoculated with the pustular matter, fifty-seven had an eruption ; and those who received the disease from any of those fifty-seven, appeared also to have had pustules in nearly the same proportion. I may also remark, that the disease before mentioned, as proving fatal to a patient, was excited from matter of this description. Whence it appears, that the cowpox, from certain circumstances, is not only liable to lose the characters which distinguish it from smallpox, but also to propagate itself under this new and casual modification. The vaccine disease and the human variolæ ought therefore," he concludes, " to be considered as only varieties of the same disease, rather than as distinct species *."

This

* Reports of a series of inoculations for the Variolæ Vaccinæ or Cowpox, with remarks and observations on this disease, considered as a substitute for the Smallpox ; by William Woodville, M. D. Physician to the Smallpox and Inoculation Hospitals, page 149, *et seq.*

This report of Doctor Woodville, was there no mistake in the case with regard to the disease which prevailed, would of itself be quite sufficient to prevent the general introduction of cowpox inoculation as a succedaneum for smallpox ; and I have been thus careful in detailing his sentiments conveyed in it, first because, considering the quarter from whence it comes, it is the strongest evidence that has yet appeared against the cowpox, and one where all the particulars upon which it is founded have been more accurately stated than in any other which I have met with; and, secondly, because I am of opinion, that, on attentively considering the circumstances under which it was formed, and comparing those with what has occurred to myself and others employed in cowpox inoculation, I shall be able to evince, that the severity of the symptoms was entirely owing to causes quite unconnected with cowpox.

In order to do this, it is necessary for me to state the following fact, which has been frequently observed

served by myself and others, who have had much experience in the practice of cowpox inoculation.

If a person who has neither had the cowpox nor the smallpox be exposed to the contagion of the latter, and is soon afterwards inoculated for the former, the inoculated affection may advance in a perfectly regular course, at least so far as the local appearance can indicate, and still, at the end of such a number of days, as may be necessary for the smallpox contagion to show its effects upon the constitution, the person may sicken and go through the disease of smallpox with an eruption of pustules, more or less numerous, according to circumstances.

The following history of vaccination in a family that applied at the Public Dispensary for inoculation, while it illustrates this is also highly interesting and instructive.

J. Nelson brought three children to the Edinburgh Public Dispensary to be inoculated for cowpox,

pox, on Wednesday the 18th of March 1801. The operation was performed on each; and the arms of all soon showed the usual appearance of the virus having taken effect.

The vesicles were formed and advanced with perfect regularity; and, on the 27th, the oldest of the three (James) was brought to me for advice at my own house. The affection on the arm had the areola well formed, and appeared every way well advanced for the period elapsed from inoculation, and the vesicle was quite characteristic of cowpox. The mother informed me, that for two days he had been very feverish, and that his sleep had been much disturbed with startings; his pulse was then unusually frequent; his skin hot, and tongue white. It was ordered that he should have a brisk purge, and be kept very cool. On the morning of the 30th, he was again brought to me. The mother then informed me that the fever had continued until the morning of the 29th; during which day she had observed several small pimples to appear upon
his

his face and body, which were, at the time of my seeing him, (on the 30th) very conspicuous, and certainly had much the appearance of smallpox. On the same day, the 30th, Jean Nelson, another of the three, was also brought for advice. On the 28th, she had been attacked with a smart fever, which still continued when I saw her; and an eruption resembling that on her brother, but greatly more numerous, appeared also on her, during the night of the 29th.

On examining her arm, the cowpox affection appeared to have advanced quite regularly, and there was, at that time, an uncommonly large inflamed and hard areola. The mother, on being questioned, denied that the children had been, at least to her knowledge, exposed to the contagion of smallpox. Regular reports of these cases were daily marked; and it appears, from them, that the pustules on the bodies of both children advanced regularly to maturity, after the manner of variolous pustules; and that their appearance, in every respect,

respect, left not the smallest doubt, on the minds of many medical men who saw them, that they were the genuine pustules of smallpox.

Both the cowpox affection on the arm, and the smallpox eruption, advanced regularly; and, on the 16th of April, the report is as follows: James and Jean Nelson both convalescent. The father, who had hitherto also denied his knowledge of the children having been exposed to the contagion of smallpox, now made the following voluntary confession. "You, Sir, have always suspected that the children had been exposed to the smallpox, and indeed I was afraid to confess it, so long as they remained ill, for fear they might have died, and I should have got the blame; but, to tell the truth, I took the boy along with me to a house in the Cowgate, where there was a child ill of the natural smallpox, on the Sunday (the 15th) before he was inoculated for cowpox; and I have no doubt but he might have been infected at that time, and perhaps also brought the disease to his sister." The remaining child has

gone regularly through the cowpox affection; she has had no evident fever, but nevertheless has entirely escaped the smallpox, although she has eat and slept with the other two children during the whole time they were ill of that disease. On the 30th July, this third child still continued free from smallpox.

Here it is perfectly clear, that the smallpox contagion must have been lodged in the system a considerable time before any action from the cowpox virus took place. The boy must have been infected directly on the 15th, and he or his father may have carried the infection to the sister, for it is perfectly ascertained that none of the family were again exposed to the smallpox contagion after that period. It seems somewhat extraordinary, however, that the cowpox affection should have advanced with such regularity; and that, at the very time of the eruptive fever of smallpox, the marks which have hitherto been regarded as denoting a constitutional affection in cowpox, viz. the inflamed and hard areola,

areola, should also have been in perfection. In these two cases, and in several similar ones which have since fallen under my own observation, there appears to have been two diseases present, viz. the smallpox as a constitutional disease, and the cowpox as a mere local affection.

Now, to apply these observations to the cases of Dr Woodville, I would assert, that in every instance where eruptions appeared in his practice, as detailed in his tables, at least when they were in any considerable number, and, as he observes, “not to be distinguished from the common variolous pustules,” the general constitutional disease was, as in the cases of the two Nelsons, the smallpox. It will be recollected, that all those cases were inoculated at the “Inoculating Hospital,” where the patients were necessarily, for some time, exposed to a state of the atmosphere completely variolated, or loaded with the contagion of smallpox; what wonder then that they, like the Nelsons, should be infected with that disease? It appears also, that many
were

were actually inoculated with the virus of smallpox, in place of the virus of cowpox as was intended, for the matter was taken from pustules on the body, and produced a pustular disease on the 7th and 8th days from inoculation. In a future publication, Dr Woodville mentions his suspicions, that these pustular cases might be owing to some *modification* of cowpox from the presence of a variolated atmosphere; because he found, that when he inoculated patients in different parts of the city, with the same stock of cowpox virus, such patients had the affection in its mildest form; and, on the other hand, that in a village near London, where the smallpox was frequent, eruptions, during the course of the cowpox, also frequently appeared. “From this circumstance I suspect,” says the Doctor, “that where the smallpox is epidemic, the cowpox will be found to be equally liable to excite pustules as in the hospital.” He adds, “But in what way the variolous miasma acts in thus *modifying* the cowpox, or why they co-operate in some, and not in all cases of vaccine infection, I shall not even venture

ture a conjecture; the causes will probably continue as inexplicable as those constitutional peculiarities which produce all the varieties of smallpox*.” That in situations where the smallpox is epidemic, and where children are exposed to variolous contagion about the time of their being inoculated for cowpox, variolous looking eruptions will appear, is certainly true; but that these are the effect of the vaccine inoculation, or are to be regarded as a symptom of *modified* cowpox, I apprehend is an opinion totally erroneous; because, had this been the case, the disease would certainly have been propagated under this modified form, whether virus had been taken from the pustules on the body, or from the vesicle produced on the arm by the insertion of the virus of cowpox. But the contrary takes place; and the Doctor expressly mentions, that the matter from the pustules did almost always produce a pustular disease, as indeed was naturally to be expected, seeing these were true variolous pustules;

* Vide Medical and Physical Journal for September 1800, p. 258.

tules ; while that taken from the inoculated vesicle on the arm, even of such as had numerous pustules on the body, produced the most genuine cowpox affection. Thus, we are told that pustular matter produced a pustular disease in fifty-seven cases out of sixty that were inoculated with it ; while matter taken from the arm of Ann Bumpus, who was inoculated with virus of cowpox, and who had also an eruption of three hundred and ten pustules on her body, produced an affection, in one hundred and sixty persons who were inoculated from that source, which Dr Jenner himself pronounced to be the true uncontaminated cowpox. Similar instances have come under my own observation, where though virus was taken from the inoculated cowpox affection during a very febrile state, which turned out to be the eruptive fever of smallpox, yet this virus produced, in all those inoculated with it, the true cowpox. These cases of eruptions, therefore, I can by no means agree with Doctor Woodville in calling cases of modified cowpox. There were certainly two distinct and separate diseases present,

each

each of which was capable of producing its like by inoculation—The smallpox as a constitutional disease, and the cowpox as a mere local affection.

From these observations, I must conclude, that all those cases where a numerous eruption of pustules appeared after inoculation for cowpox, as detailed by Dr Woodville, and as mentioned by many others, are not to be regarded as cases of cowpox *either simple or modified*, but as cases of genuine smallpox, while the cowpox affection was merely confined to the part inoculated. Hence it follows, that the case recorded by Dr Woodville as a case of cowpox which terminated fatally, is in reality to be regarded as a case of pure smallpox, that infant having been inoculated with pustular matter, and having died in fits of the convulsive kind during an eruption of pustules, eighty of which had appeared; and that neither this death nor the eruption resembling variolous pustules can with the smallest degree of propriety be laid to the charge of cowpox.

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There are other eruptions which have also been observed to occur during the progress of cowpox, such as chickenpox, measles, &c. The former of these, I have observed at different periods of the cowpox affection, and still this has held a regular course, at least in so far as the local affection could indicate. But a question of much importance occurs here, which I have not yet had sufficient opportunity of resolving, namely, whether by the super-vention of the chickenpox or the measles, during the course of cowpox, the constitutional affection of the latter will be merely suspended for a while, or whether it may not be entirely prevented, and so leave the person still liable to the action of small-pox. In two instances mentioned by Dr Jenner, where the symptoms of scarlatina anginosa supervened on the evening of the eighth day from inoculation for cowpox, effects of a very singular nature were observed. In the one case, the symptoms regarded as the criterion of the constitutional affection in cowpox, viz. the inflamed and hard areola, were suspended until the scarlatina had retired from
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the constitution. In the other case, the activity of the cowpox affection was such as not only to suspend the symptoms of scarlatina; but even to remove these, after they had shown their presence, by the scarlet eruption, for nearly twelve hours; and preserve its own action uncontrouled for the space of four days: after which, the symptoms of scarlatina recurred, and proceeded in a regular course*.

* Vide a continuation of facts and observations relative to the Variolæ Vaccinæ, by Dr Jenner, page 30.

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C H A P. II.

OF THE ADVANTAGES WHICH WILL RESULT TO
SOCIETY FROM THE GENERAL PRACTICE OF
INOCULATION FOR THE COWPOX.

S E C T. I.

*The Cowpox Affection is greatly milder than the
Smallpox.*

THE advantages which will result to society
from the general practice of cowpox inocula-
tion, as a substitute for smallpox, are great beyond
calculation ;

calculation; and the comforts which will be experienced by individuals are such as to render this an object worthy of our most serious attention.

From the works of the ingenious Jenner, we may collect the following position concerning the nature of cowpox, which will serve to illustrate some of the advantages arising from the new inoculation.

The cowpox is greatly milder than the smallpox, even under the most approved mode of treatment; being never attended with danger, seldom even with sickness, and never producing pustules generally over the body, nor indeed any, but on those parts to which the virus of inoculation has been directly applied.

The smallpox, propagated by contagion, is allowed to be one of the most loathsome and fatal diseases to which mankind are liable; and although great improvements have been made in the medical
treatment

treatment of that malady, yet the bills of mortality, especially those of large cities, still shew that the numbers annually cut off by that disease are so great as to be truly distressing.

In London, there is one death from smallpox in every six and one-half of all births; and in Liverpool, the proportion is rather greater. In Glasgow, it appears that one in seven die from smallpox; and were the bills of mortality regularly kept in this city, it is thought there would be little reason to suppose that its inhabitants were more favoured than those of other cities in this respect.

The mode of giving the smallpox by inoculation, which has been more or less prevalent in this country for nearly eighty years, was deservedly reckoned one of the greatest discoveries in the healing art, as by this operation, if universally practised, the mortality from that disease might be greatly diminished. Thus, according to the reports of Dr
Wood-

Woodville, it appears, that the average of deaths from inoculated smallpox is scarcely more than one in five or six hundred; and if one in six die from smallpox propagated by contagion, it follows, that ninety-nine out of six hundred might be saved by inoculation. It may be doubted, however, whether the practice of inoculation for smallpox, to the extent it is now performed, has lessened the mortality from that disease; for although this operation certainly renders smallpox more mild in those upon whom it is performed, yet there cannot be a doubt, that, by inoculation, smallpox propagated by contagion has become greatly more prevalent. This is so much the case, that while formerly many attained to old age without being affected by smallpox, it is now, from inoculation being almost constantly performed in some part of every great city, rendered nearly impossible for any person to escape that disease, even during the years of infancy and childhood: And, as by far the greatest proportion of mankind, at least in this

this country, do still persist in rejecting the advantages held out by inoculation, refusing to give or to receive a disease, which, even under circumstances apparently the most favourable, cannot be declared void of danger, and which may prove fatal, it will, it is apprehended, upon strict enquiry, be found true, that inoculation, although it certainly saves the lives of many who have smallpox, does nevertheless increase the number of those to whom that disease proves fatal.

Having thus stated the great mortality from the severity of the smallpox, even under the most approved mode of treatment, we have next to observe, concerning the mild nature of cowpox, that although, upon a very moderate calculation, upwards of 100,000 persons have already been inoculated in these realms, yet there is not on record one instance of the affection having proved fatal. The knowledge of this fact alone, when contrasted with the account of the yearly mortality occasioned
by

by smallpox, which in Great Britain and Ireland is computed at 45,000 persons, might afford sufficient proof of the truth of our position; but it is not to this vast saving of human lives alone that the advantages resulting from the new inoculation are confined. Blindness, lameness, and scars upon the face, well known as the frequent consequences of smallpox, will, by the general introduction of cowpox, be no longer dreaded; and fits, so alarming and frequently fatal at the period of the eruption of the smallpox, although of the most benign kind, have not been observed, at least not so frequently, at any period of cowpox. From the great mildness of cowpox also, it may be communicated to the human constitution at all periods of life. During pregnancy even, a state when smallpox is particularly severe, this ailment may be communicated with safety. From the little derangement which takes place in the constitution during the operation of cowpox, no disease is called forth to which there may have been a predisposition, nor has this affection

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tion been observed to excite, or to leave in the system, a disposition towards any new disease; but, on the contrary, there are many instances mentioned, where children, who were formerly weakly and subject to eruptive disorders, have, after being affected with the cowpox, become greatly better in every respect.

I

S E C T.

S E C T. II.

*The Cowpox gives security to the Human Constitution
against the Smallpox.*



THE following position may also be collected
from the works of Dr Jenner.

Persons who have undergone both the local and
constitutional affection of cowpox are thereby
rendered unfusceptible of smallpox.

This singular fact, we have already observed, has
been known for time immemorial among those
people

people occupied in the business of dairies; and it is now fully confirmed by the concurring testimony of thousands of medical men, who have made it their business to investigate the subject with that diligent attention which its importance demands.

It is not meant by this position to assert, as has too generally been imagined, that every person who has been inoculated for the cowpox is immediately rendered secure against the contagion of smallpox. There are many circumstances, besides the mere inoculation, absolutely necessary to be ascertained before this security can be guaranteed. These circumstances, however, I decline mentioning at present, as I trust they will appear to be fully treated of in a future part of this essay.

Again, it is well known, that a person having undergone the smallpox is not absolutely secure against a future attack from that malady, as well authenticated instances are recorded where the same
 person

person has undergone this disease a second time, and these attacks were neither of them local, but very certainly general constitutional affections *. Now, with regard to the cowpox, it may also happen, that a person who has undergone that affection may yet be afterwards affected with smallpox ; but, as is well known in the former case relative to smallpox, so also in the latter relative to cowpox, the instances of the second attack from smallpox, or of the failure of the antivariolous power of cowpox, are so very rare, as by no means to affect the general established rule : That persons who have once undergone the smallpox, or the cowpox as a constitutional affection, may thenceforth be reckoned
secure

* See particularly the case of Mr R. Langford, recorded in the fourth volume of the Memoirs of the Medical Society of London. That gentleman was infected with the smallpox at a very early period of life, and was much marked from the severity of the disease. Many years afterwards, he was again infected with the smallpox, which was of the confluent kind, and proved fatal on the twenty first day from the attack.

secure against all future attacks made by variolous contagion.

The two following cases are so similar as to merit attention. The first is given by Dr Jenner, in order to show, that, in some instances, the human constitution, after having undergone the smallpox, is still liable to be disordered by inoculation with the virus of that disease; and the second has been related to me by one on whose accuracy I can entirely depend, and shows that, in some instances, a similar disorder from inoculation with the virus of smallpox may also be communicated to the human constitution, after it has undergone the action of cowpox.

“ In my former treatises on this subject,” says Dr Jenner, “ I have remarked, that the human constitution frequently retains its susceptibility of the smallpox contagion, both from effluvia and contact, after previously feeling its influence. In farther corroboration of this declaration, many facts have
been

been communicated to me by various correspondents. I shall select one of them."

"DEAR SIR,

"SOCIETY at large must feel much indebted to you for your inquiries and observations on the nature and effects of the *variolæ vaccinæ*, &c. &c. As I conceive what I am now about to communicate to be of some importance, I imagine it cannot be uninteresting to you, especially as it will serve to corroborate your assertion of the susceptibility of the human system of the variolous contagion, although it has been previously made sensible of its action.

"In November 1793, I was desired to inoculate a person with the smallpox. I took the variolous matter from a child under the disease in the natural way, who had a large burthen of distinct pustules. The mother of the child being desirous of seeing my method of communicating the disease by inoculation,—after having opened a pustule, I introduced

duced the point of my lancet in the usual way, on the back part of my own hand, and thought no more of it until I felt a sensation in the part, which reminded me of the transaction. This happened upon the third day; on the fourth, there were all the appearances common to inoculation, at which I was not at all surpris'd, nor did I feel myself uneasy upon perceiving the inflammation continue to increase to the sixth and seventh day, accompanied with a very small quantity of fluid, repeated experiments having taught me, it might happen so with persons who had undergone the disease, and yet would escape any constitutional affection; but I was not so fortunate; for, on the eighth day, I was seized with all the symptoms of the eruptive fever, but in a much more violent degree than when I was before inoculated, which was about eighteen years previous to this, when I had a considerable number of pustules. I must confess I was now greatly alarmed, although I had been much engaged in the smallpox, having, at different times, inoculated not less than two thousand persons. I

was

was convinced my present indisposition proceeded from the insertion of the variolous matter, and therefore anxiously looked for an eruption. On the tenth day, I felt a very unpleasant sensation of stiffness and heat on each side of my face, near my ear, and the fever began to decline. The affection in my face soon terminated in three or four pustules, attended with inflammation, but which did not mature, and I was presently well.

“ I remain, Dear Sir, &c.

THOMAS MILES.”

The second case is as follows;

“ S I R,

“ I TAKE the liberty to mention a circumstance to you respecting the cowpox, which happened last summer. I inoculated a child, five years old, in May, with the vaccine matter. The matter was procured from an eminent surgeon in this city. At the usual period, the inflammation on the

the arm was evident, and the disease, in every respect, ran the common course, the child being even a little sick on the sixth or seventh day. On the tenth day, matter was taken from the pustule of a pellucid appearance, and her sister was inoculated with it, who also had the disease in the most satisfactory manner, as likewise a third sister some weeks after, but with new virus."

"Early in November, I inoculated all the three with smallpox matter, taken from a child whose sister had just died from the confluent smallpox; both these children received the contagion from an inoculated child; no other case of that disease being in the neighbourhood, of course there could be no doubt of the matter I employed being genuine. The three children then were inoculated on the Wednesday; and two days after the inflammation in all of them was quite distinct, but gradually went off again in the two youngest. In the oldest, however, she who was first inoculated

for the cowpox, the inflammation increased; and on the Monday the child was unwell, had headach, vomiting, and a degree of fever until the Saturday, but which was smartest on the Wednesday and Thursday. On the Friday, a few spots somewhat resembling smallpox, but indeed of an anomalous appearance, were observed upon the child, but these, without cold or evacuations being but in practice, gradually disappeared on the two or three succeeding days, without coming to any suppuration. The arm, however, continued sore during this, and for some time after, but without any proper pustule, and a scab forming on it fell off in a week or so.

“ This case is certainly unworthy of notice, in so far as it regards the general success of vaccine inoculation, but, as a remarkable idiosyncrasy, I have presumed to intrude it upon you.

“ I am, Sir, &c.

“ *WM. SCOT.*”

Two

Two cases which I lately had an opportunity of examining, along with Dr Farquharson, afford very satisfactory proof of the compleat efficacy of cowpox in shielding the human constitution from the action of the virus of smallpox.

Two children had been inoculated some months ago for the cowpox, and the ailment proceeded regularly through all the different stages. Lately they were also inoculated with the virus of smallpox.

In one of these children, the affection produced by the variolous inoculation advanced regularly until the sixth day, at which time a well formed pustule, with considerable surrounding inflammation, was present; after this, however, it quickly dried up, and there was no perceptible disorder excited in the constitution. In the other case, which was inoculated with the same stock of variolous matter, the affection advanced until the eighth day, at which time a well formed pustule, evidently containing

taining a fluid, and beset with numerous smaller pustules, and considerable inflammation, was also present: The whole of this affection, like the other, and contrary to the expectation of several medical gentlemen who examined it, quickly dried up during the ninth and tenth days, nor was the smallest general indisposition perceived.

Many have been the reports circulated in this city tending to shake our belief in the anti-variolous power of cowpox. Dr Farquharson and myself, however, have made it our study to investigate these in the fullest manner; and it affords me much pleasure to state, that every one of them, in so far as we have hitherto been able to trace, has proved to be erroneous; and, on the other hand, that this investigation has afforded numerous and satisfactory proofs of the compleat efficacy of the cowpox affection as a preventive of smallpox.

Again, it has been imagined by some, that although the human constitution is apparently shielded

shielded from the action of smallpox by having undergone the cowpox, yet that this security may not be permanent, but that, at the end of a certain period of time, the person will again become susceptible of smallpox. How long this period of security may continue, the favourers of this opinion have not mentioned; but, from the observations of the accurate Jenner and others, there is certainly every reason to expect that it will continue through life.

Dr Jenner's first experiments on this subject, as was before noticed, were made with a view of ascertaining the truth of the observation, that a person having undergone the cowpox rendered him secure against all future attacks from smallpox: And, for this purpose, he inoculated, with the virus of smallpox, persons who had been affected with the cowpox twenty-five, twenty-seven, thirty-one, and fifty-three years before, but who had never been infected with the smallpox, and these, he found, compleatly resisted that disease.

Mr

Mr Fermor, in Oxfordshire, has also related many cases which prove the permanency of the security afforded by the cowpox against the attacks of smallpox. “ In one instance, a person who had undergone the cowpox five or six and twenty years ago, was three times inoculated with the smallpox, four years after, without effect. Two of his brothers, who had never had the cowpox, received the variolous infection. He slept with them in order to catch the distemper if possible, but in vain. He has since that time frequently been exposed to its contagion; and has very lately inoculated his children with the smallpox without being infected.”

Another case related by Mr Fermor, is that of a person who, ten years after he had the cowpox, was three times inoculated for the smallpox, but without effect: After an interval of ten years more, he inoculated two of his children at his own house; and again, after a lapse of several years, he inoculated another child; but though fully and frequently

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ly exposed to the contagion, he was not in any degree affected by it *.

Many similar cases might be adduced to show the permanency of the security afforded against the attacks of smallpox, by the constitution having undergone the action of cowpox ; but it is apprehended that those now mentioned afford evidence which may be deemed completely satisfactory on that point.

* See Reflections on the Cowpox, by William Fermor, Esq.

S E C T.

S E C T. III.

The Cowpox is not Contagious.

ANOTHER position concerning the nature of cowpox, the knowledge of which is of much importance to society in determining the propriety of adopting the general practice of the new inoculation, is the following ;

The cowpox cannot, like the smallpox, be communicated from one person to another by contagion, that is by the exhalations arising from any one affected with that ailment.

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This position is also well attested by the experiments and observations of many medical men; and although Dr Woodville has reported, “ That this is certainly true, when the disease is confined to the inoculated part, but when it produces numerous pustules upon the body, the exhalations they send forth are capable of affecting others in the same manner as the smallpox *.” Yet this does not invalidate the proposition, since, for reasons before given, it is clear that the disease under which the patients laboured, from whose cases he deduced his opinion, was not cowpox but genuine smallpox.

Persons who have neither had the cowpox nor the smallpox have been made to sleep, and be constantly with those inoculated for the former, throughout all its stages; nay, have been made to breathe over the local affection of cowpox at the most virulent period of its course, yet the ailment has never been produced in this way, nor by any other

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* Reports of a series of inoculations, &c. page 153.

than by actual contact with the virus—that is, by inoculation.

Such then are the great advantages and comforts which the general practice of cowpox inoculation promises to society and to individuals; and who is there at all acquainted with the history of smallpox, and with the ravages committed by that direful malady, that will not join with me in giving to Dr Jenner that unqualified praise he so richly deserves. To him alone is society indebted for the discovery, and for all the beneficial consequences which may follow the practice of this new species of inoculation. His sagacity first duly appreciated the observation of a certain affection being communicated from the cow to the hands of her milker, which proved a security against the smallpox; his ingenuity devised a method by which this blessing might be propagated among mankind; and his perseverance in expiscating and collecting facts, his judgment in appreciating them, and, lastly, his candour in promulgating the whole with that benevolence

nevolence so characteristic of a true welwisher of society, has woven for himself an everlasting crown of honour.

Dr Jenner has thus acted his part; it remains for the other members of society to act theirs; he has shown how important advantages may be obtained; it is theirs to carry this plan into execution by co-operating, both by example and by precept, to render general the practice of inoculation for cowpox: the reward being no less than the exterminating one of the most loathsome and fatal diseases to which mankind are liable—The smallpox. I must here, however, observe, that it is not the prevention of smallpox in a country for a few years, or perhaps a century, that ought to be regarded sufficient; that insidious disease is now known nearly throughout the whole inhabited globe, there being few countries where the inhabitants do not smart under its baneful influence. Although, therefore, the inoculation for cowpox be

so general that a case of smallpox should not be known for half a century or more, over a vast extent of nations, yet if it should then unfortunately so happen, that the advantages resulting from cowpox are forgotten, or undervalued, and they can only be duly appreciated by those who are acquainted with the ravages committed by smallpox, and that the general practice of cowpox inoculation were to be neglected, then the smallpox may again be imported from some remote corner where the influence of cowpox was unknown, or it may originate *de novo*, (for who knows whence this pestilence proceeds?) and hold a course among mankind nearly as terrific as that described by authors who relate the ravages of this dreadful disease.

In order to prevent this foreboded evil, which would, with posterity, soon counter balance all the advantages which we are about to derive from the benign influence of cowpox, it were to be wished the inoculation of this ailment was taken under the
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consideration and direction of the legislative powers in every nation.—Measures might be contrived not only for rendering vaccine inoculation general, but also for continuing it with unremitting diligence throughout future ages. Public institutions for inoculation might be erected, and proper officers appointed, to whom returns of all christenings should be made; and it should be the duty of these officers carefully to observe that every child, before a certain age, be infected with the cowpox. The advantages which would result to every well regulated state, from such establishments, are too evident to require illustration; and the pleasing thought of co-operating to diminish the lot of human sufferings, would render the strict observance of such measures as might be deemed necessary, the particular duty of every wellwisher of the human race.

C H A P. III.

OF CIRCUMSTANCES TO BE CAREFULLY ATTENDED TO BY THOSE CONDUCTING THE INOCULATION OF COWPOX, THAT SOCIETY MAY REAP ALL THE ADVANTAGES WHICH CAN RESULT FROM THAT OPERATION.

S E C T. I.

Of the Distinguishing Marks of Cowpox.

IT has long been an observation in the medical world, that the most active and effectual remedies have often fallen into discredit from the ignorance

ance or inattention under which the administration of them has been conducted. In no instance is this observation more likely to prove just than in the inoculation for cowpox. Already have we seen that this mild ailment has been accused, from inadvertence, of producing great and serious evils, as eruptions, severe sickness, and even death, of which it now appears to have been perfectly innocent; and other instances have been told me where, from ignorance, inoculation was performed with matter very different from that of cowpox, a different affection was produced, and the persons left not only in a state of disease, falsely attributed to the matter of cowpox, but also still susceptible of smallpox, with which they were really afterwards infected.

In order that society may reap all the advantages which can result from the general inoculation of cowpox, it appears absolutely necessary, that those who undertake to conduct that operation be particularly

cularly attentive to obtain such a knowledge of those peculiarities in the appearance of cowpox, as may serve to distinguish it from every other affection.

It has frequently happened, that persons have been affected with eruptions on the hands and arms, followed by severe general indisposition, from milking diseased cows; and yet have afterwards, on exposure to variolous contagion, been severely affected with smallpox. This shows that there are eruptive diseases affecting cows different from cowpox, which may be communicated to man, however, without rendering his constitution unsusceptible of smallpox.

The disagreeable consequences which have resulted from an opinion of the unsusceptibility of smallpox, after having been affected in the manner now described, are numerous, even before the introduction of inoculation for cowpox; and now these,

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without great precaution, may be increased ; virus for inoculation may be taken from persons thus affected from milking cows, and propagated among mankind for that of cowpox.

Again, it has also frequently happened, from an insufficient knowledge of the appearance of the cowpox affection on the human species, that virus for inoculation has been taken from pustules or vesicles on the human body very different from those of cowpox. With this, inoculation has been performed ; and the consequences have not only been highly prejudicial to the persons infected, but have also served to bring the new inoculation into very unmerited discredit.

From a consideration of these circumstances, it will readily appear, that it is of the first importance to society, in the propagation of cowpox, to ascertain sure marks whereby this ailment may be readily distinguished from all others, both as affecting cows and as affecting the human species.

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The pustular eruptions which appear upon the udders and teats of cows, chiefly in the spring season, and which are often communicated to the hands of their milkers, without giving security against the attacks of smallpox, are many and various. Dr Jenner has paid particular attention to this part of his favourite subject, and he draws the following distinction between them and cowpox.

The cowpox is a more severe disease than any of the other pustular diseases with which cows are affected,—and the vesicles of it have a livid or bluish appearance, which is not observable in the others. The cowpox is also attended, at a particular period of its course, with a surrounding erysipelatous inflammation, and very considerable hardness; and the affection is apt to degenerate into foul and troublesome ulcers. During the course of the disease, the cow is observed to refuse food, and the secretion of milk is considerably diminished, none of which symptoms take place in the other pustular affections.

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It is also added, on the authority of those who are conversant in the treatment of cattle under these eruptive diseases, that the cowpox is to be distinguished from all the other pustulous sores, by the latter never eating into the fleshy parts like the vesicles of the former, but affecting the skin only, quickly ending in scabs, and particularly by their not being nearly so infectious.

Dr Jenner relates the case of a girl who was affected with an eruption in consequence of milking cows, which, at the same time that it was so similar in its course as to be mistaken for cowpox by the people of the dairy, yet is sufficiently marked, by the presence of many of those distinguishing symptoms above mentioned, for us to declare that it was a very different affection.

“ Sarah Merlin lived at a dairy consisting of eighteen cows. The nipples and udders of three of the cows were extensively affected with large white blisters.

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These cows, the girl milked daily; and, at the same time, assisted with two others in milking the rest of the herd.

“ It soon appeared that the disease was communicated to the girl. The rest of the cows escaped the infection, although they were milked by her several days after the three above specified had these eruptions, and even after her hands became sore.

“ The two others, who were engaged in milking the cows indiscriminately, received no injury. On the fingers of each of the hands of the girl appeared several large white blisters, she supposes about three or four on each finger. The hands and arms inflamed and swelled, but no constitutional indisposition followed. The sores were anointed with some domestic ointment, and got well without ulcerating.

“ As this malady was called the cowpox, and
regarded

regarded as such in the mind of the patient, she became regardless of the smallpox; but, on being exposed to it some years afterwards, she was infected, and had a full burthen *.”

In this history we find wherewithal to distinguish the affection from cowpox, according to the marks just laid down—The vesicles were white, and wanted the bluish appearance of cowpox. The affection, though communicated to the girl by numerous inoculations, was mild, did not affect the constitution, at least to any perceptible degree, nor did it ulcerate. And although the same persons milked the whole eighteen cows indiscriminately, yet neither were any of the other persons or cows infected, a circumstance proving this disease to have been much less infectious than cowpox.

It must not, however, be concealed, that although the distinction between cowpox and the above case of eruptions, which was so similar as to be

* Jenner's Inquiry, &c. 2d edit. p. 75.

be mistaken for cowpox, is pretty clearly pointed out, yet this cannot be expected in every case ; for even Dr Jenner himself allows that it is extremely difficult, in many cases, to distinguish between the true, and what he calls the spurious cowpox, as affecting cows.

Seeing then, that this difficulty still exists, and that cowpox, as affecting the cow, has been, and still may be, liable to be confounded with other pustular eruptions, to the great detriment of the new inoculation and all concerned, I would have it observed as a positive rule, that in all cases where recourse is had to the cow to obtain virus for inoculation, the affection, or virus reproduced on the person inoculated, never should be farther propagated among mankind without being first subjected to the true and only test. Thus, when virus is taken from the vesicle on the cow, and inserted into the human subject, if an affection is produced having all the appearances of cowpox as described above,

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the earliest opportunity should be taken to expose such persons to the contagion of smallpox, either by inoculation or otherwise, in order that the anti-variola powers of the affection gone through, may be well ascertained before the virus, thus generated, be widely propagated as that of cowpox. The virus, thus proved and found effectual, is to be carefully preserved, and alone employed; and it should be a maxim, and one never to be deviated from among medical men, and all others who engage in cowpox inoculation, never to use virus for this purpose unless they can ascertain that the stock from whence it was produced had been proved in the manner above specified.

With regard to the symptoms which may serve to distinguish the cowpox as affecting the human subject, I would observe, that by a strict attention to the progress of the phenomena, and to the different appearances mentioned in the description of this ailment, we may, in my opinion, readily distinguish it from all
others;

others; more especially if we keep in remembrance, that pustular eruptions appearing on other parts of the body than where the virus may have been applied, and advancing to maturation, do not belong to cowpox. This teaches a very useful lesson in the practice of cowpox inoculation, viz. never to take virus for the propagation of this ailment from any pustule or vesicle which may appear upon any other part of the body during the cowpox affection than that where the inoculation had been performed. Inattention to this rule has already been attended with the most disagreeable consequences.

Many have thought that the cowpox and the smallpox were originally the same disease, and that the greater severity of the latter was owing to certain accidental circumstances, as the combination with other diseases, &c. still working new changes upon the original mild ailment, until it had acquired all the malignant qualities under which we now see it

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making its devastations amongst us : and, as the natural consequence of such an opinion, that the cowpox might be expected gradually to lose its present mild character, and, by passing through a variety of constitutions, become again as severe a disease as smallpox.

While those cases in which eruptions succeeded to the vaccine inoculation, as recorded by Doctor Woodville and others, were regarded as cases of cowpox, there seemed some foundation for these opinions : now, however, there are many circumstances ascertained concerning the nature of cowpox, which render it highly probable that this, and those cases where eruptions were observed, are quite separate and distinct affections, agreeing in nothing but that of rendering the same constitution unsusceptible of the action of each other ; and that the above opinion was formed rather with a view of explaining what was not understood than from any correct reasoning on the subject.

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In the first place, the appearance of the topical affection, induced by the inoculation of each, is perfectly different : In the cowpox, the vesicle is circular, with a regular and well defined margin, the edges are elevated and turgid, while the center is depressed, and, so early as the fifth or sixth day, occupied by a hard crust, which gradually increases until the whole vesicle is dried up, about the twelfth or thirteenth day from inoculation.

The affection produced by the inoculation of smallpox, on the other hand, is not circular, but consists of many distinct pustules, which, after some time, unite and give a very irregular appearance to the whole—nor is any crust formed upon the pustules thus produced until they have matured, or arrived at their height as it is called. The varicellous pustule also, when at its height, contains well formed pus; and afterwards dries into a thin, rough, opaque scab, while the fluid of the cowpox vesicle
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is always limpid, and ultimately concretes into a smooth and semi-transparent crust. The whole of the fluid too found in the smallpox pustule is contained in one cavity, and is readily evacuated by one small puncture:—But the structure of the cowpox vesicle is cellular, somewhat resembling a honey-comb, and the cells seem to have no communication.

In smallpox, also, an eruption of pustules, more or less numerous, takes place over the surface of the body: In cowpox, no eruption appears, unless on the spot where the virus of inoculation is applied.

Another great and important difference between the cowpox and the smallpox is, that the former cannot be communicated by contagion, or the effluvia arising from the body of a person under the influence of its specific operation; whereas, the highly contagious nature of smallpox, the great prevalence

valence of that disease being entirely owing to that quality, is notorious.

Again, the virus of cowpox, after passing repeatedly through the human constitution, still retains the power of exciting a disease in the cow every way similar to that by which it was originally produced in man; but the virus of smallpox inserted into the cow, although it has been done by many expert inoculators, has hitherto failed of producing any disease,

These very material differences between cowpox and smallpox give us good ground to hope, that the mild character of the former will never degenerate into the malignant nature of the latter: And this, we have farther reason to expect, when we consider, that although the virus of cowpox has already passed through a great variety of human constitutions, yet there is not observed in its mode of action the smallest approximation to that of smallpox.

pox. In my own hands, the virus of cowpox has already been regenerated about sixty times on different persons, and among these there have been great variety of constitutions, but still neither Dr Farquharson nor myself are sensible of the smallest difference in its mode of action.

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S E C T. II.

Of the State of the Person to be Inoculated.

THE next circumstance to be carefully attended to in conducting the inoculation of cowpox, is the state of the person on whom the operation is to be performed.

It appears, from the cases detailed by various writers on this subject, that infants a few days old, nay almost immediately after birth, have been inoculated, and have gone through the cowpox affection with

with as great regularity, and with as much ease, as those more advanced in life. That this has been the case there can be no doubt, and it certainly marks the great mildness of the constitutional ailment, but, with regard to the propriety of the measure, I confess I am not altogether satisfied; and, from a consideration of the very great degree of irritability of infants at this period of life, whereby febrile symptoms, if once excited, must be expected to be of very doubtful issue, and whereby the introduction of any foreign and active agent, such as the virus of cowpox, into their constitution, might be expected to produce such a degree of derangement as to induce convulsive fits, which are always, at such a period of life, attended with imminent danger, I find myself much inclined to prohibit the inoculation for cowpox until about the end of the third month. Should smallpox, however, be in the neighbourhood, and there be, in consequence, the smallest chance of the contagion spreading to the infant, then, no age, however young,

young, should prevent immediate inoculation for cowpox. The presence of this dreadful malady appears to me, however, the only cause which can render the inoculation for cowpox eligible before the end of the third month.

During the period of teething also, children are in general so irritable, that unless there exists some urgent cause, as the presence of smallpox in the neighbourhood, the inoculation for cowpox had better be delayed, for the same reasons as mentioned above. Besides, at such times, children are liable to frequent febrile attacks, and to eruptions over their body, proceeding from irritation. From these causes, the specific action of cowpox may either be suspended beyond the regular period, creating doubt and anxiety, or it may perhaps be altogether superseded.

Again, even although the cowpox affection may advance regularly for some days, yet the general

restlessness which prevails during the irritable state of teething, is such as frequently to occasion the vesicle to be rubbed and broken, and so its contents may be compleatly effused, and the part degenerate into an ulcerous state, at too early a period to ensure the constitutional affection.—Or the virus may be carried, by the fingers or otherwise, to different parts of the body, and there, from the state of the skin, perhaps covered with eruptions, readily excite new vesicles; thus reproducing many local affections, each of which will be nearly as severe as the original one produced by inoculation. From this circumstance, I lately saw the affection communicated from the arm of a child to the eyelid, which became so much swelled as to occasion some trouble, and shut up that eye for three days. And here I have to observe, that the only other case, among upwards of 700, which have fallen under my immediate inspection, in which I have ever seen eruptions upon any other part of the body than that where the virus was intentionally applied,

plied, and which could with any degree of propriety be attributed to the effect of the cowpox inoculation, was under circumstances precisely similar to what I have now mentioned. A child was inoculated at the Public Dispensary: The affection advanced regularly; and, on the seventh day, matter was taken from the vesicle for inoculation. On the ninth day, the mother observed a vesicle on the fore-arm of the same side, and one near the part inoculated. About the same time, another was observed over the scapula or shoulder-blade of the same side, and a fourth on the loins; on the eleventh day, when the child was brought again to the Dispensary, these four secondary vesicles appeared nearly as far advanced as the original one: And what proves them to have been cowpox vesicles is, that Dr Farquharson took virus from the one over the shoulder-blade, and with it produced the proper affection in another child who was therewith inoculated.

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Here, I suppose, the vesicles which appeared in the course of the affection were produced by a second and casual inoculation from the application of some of the virus which had flowed from the original vesicle. That much virus had been effused after taking matter from it on the seventh day, we had proof both from the report of the mother, and also from the appearance of the vesicle on the eleventh day; and the state of the skin seemed at that time to have been particularly favourable for being affected by it after the application.

The irritable state of the body during teething, I am, therefore, inclined to think unfavourable for the inoculation of cowpox; both on account of the great tendency to fits, which is thereby induced, and for the other reasons just mentioned; and I am clearly of opinion, that unless the presence of the smallpox in the neighbourhood should render this necessary, it will be more for the advantage of all concerned,

concerned, as well as for the credit of the cowpox, to defer the inoculation until the eruptions, and general affections of the system, which are the consequences of this irritable state, shall have disappeared.

It does not appear to me, that any of those chronic eruptions to which children are liable should prevent the inoculation of cowpox, more especially if care be taken to preserve the vesicle entire, so that no new inoculation may take place. Some diseases, such as tinea capitis, sore ears, and sore eyes, I have known to become much milder after the person had undergone the cowpox affection.

In all scrofulous cases, and even during pregnancy, the inoculation for cowpox may be performed with great safety.

The presence of smallpox in the neighbourhood, or persons being placed under circumstances whereby
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they become exposed to the contagion of that disease, is in every instance to be reckoned an inducement for, rather than an argument against, the immediate inoculation for cowpox. The vulgar generally start objections to this opinion, but to those who think one moment, the propriety of the position must be obvious. There is reason to suppose, that the contagion of smallpox, introduced into the human body in the state of effluvia, takes generally fourteen days to manifest its operation on the system, while the constitutional affection of cowpox seems to take place on the eighth or ninth day from inoculation, when the progress is regular. Now, as we have no mark whereby to guide us concerning the presence of smallpox contagion in the body, until the fever or eruption take place, and whereby we might judge of our remedy being inadequate to prevent the threatened danger, no idle conjecture, that the antidote might be applied too late, should ever prevent immediate inoculation; and
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this the more especially, as it is well known that some constitutions are much less liable to suffer from exposure to contagion than others, nay, that the same person is less susceptible of the action of this agent at one time than at another. And also, because it appears, from the observations made by others as well as myself, that when the smallpox does supervene during the course of cowpox, no increase of the severity of symptoms is at all to be apprehended; nay, it is thought, and I believe with truth, that when this coincidence does take place, especially if the cowpox affection had made some progress, as after the seventh or eighth day, the symptoms of smallpox are rendered milder, judging from a comparison of the case with others occurring where no cowpox inoculation had been made, or from the apparent severity of the first symptoms. Having, however, performed inoculation under such circumstances, we are afterwards carefully to discriminate whether the smallpox or the cow-

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pox prevails, and not to attribute the severe symptoms which generally take place in the former to the mild and gentle nature of the latter. When I inoculate for cowpox under similar circumstances, I always intimate, that security from smallpox cannot be promised for the space of fourteen days, that is, until the usual period for the appearance of that disease, after the contagion may have been applied, has passed away, and the cowpox affection has exerted its full powers upon the constitution.

It is proper here to observe, that inoculation for the cowpox has been carried on at the Edinburgh Public Dispensary, by Dr Farquharson and myself, during the severity of our winter, and also during the whole of last summer, when the thermometer was uncommonly high for this climate, without our being able to observe any aggravation of symptoms which could at all be attributed to the difference in the temperature of these seasons. Reports

ports also from the south of Europe, and from the more northern climates, testify the uniform mildness in the appearance of every symptom of cowpox: We are, therefore, warranted to conclude, that in this climate, at least, this new inoculation may be performed at all seasons of the year with equal advantage.

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S E C T. III.

Of the Virus to be used for Inoculation.

A PROPER attention to the state of the virus to be inserted, is a circumstance of much importance in conducting the inoculation for cowpox. If matter for inoculation be taken at an improper period of the ailment, or be not properly preserved after it is taken, it may be so far changed in its nature as to be utterly unfit to produce cowpox in the person to whom it is applied.

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With regard to the proper period of the cowpox affection for obtaining virus for inoculation, it is to be observed, that, during the seventh, eighth, and ninth days, it appears to be in the state of greatest activity. This observation, however, it must be remembered, is only applicable to those cases which run through a perfectly regular course; for as we frequently find that, from various causes, the progress of the vesicle is accelerated or retarded, so in these the proper period for obtaining the virus in the most active state will be different from that now mentioned. This point, therefore, must be determined, in a great measure, by a careful examination of the state of the vesicle at the time.

During the seventh, eighth, and ninth days from inoculation, when the affection has proceeded regularly, the vesicle appears of very considerable magnitude, elevated above the surrounding parts, and having a flat or rather concave surface, with a small crust in the centre. The margin is turgid
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and pale, giving a very singular appearance, as if a round body, like a worm, were coiled up immediately under the cuticle, and as yet the areola is incomplete. If a puncture be made into the vesicle, in the manner hereafter to be mentioned, while in this stage of its progress, a perfectly transparent fluid exudes. This is the proper virus, and in a state of the greatest activity. About the end of the ninth or beginning of the tenth day from inoculation, the areola is fully formed; and this is said to be a mark that the virus begins to be less active, and therefore improper to be used. It is also said, that virus taken after this period, frequently fails of producing the anti-variolaous process in the constitution, even although the local affection appears to run a regular course.

I have inoculated, and produced the proper affection with virus taken from a vesicle the fourth day from inoculation; but the quantity of virus to be had at this period is so small, and the risk of disturbing

turbing the regular progress of the vesicle from which it is taken, is so great, that, in my opinion, it ought never to be done, especially as, by waiting until the vesicle is in the state described above, abundance of virus may, almost always, be obtained, and much freedom may then be used without fear of impeding the regular progress of the affection.

Again, I have inoculated with virus which was taken at the end of the eleventh day from inoculation, and after the areola had been completely formed, and with it have produced the affection regular in all its stages : But I have observed, that the virus, when taken at this stage of the affection, was less certain of taking effect, and that it frequently happened, that although the appearances were favourable for the first three or four days, yet that they would then gradually die away, and no vesicle be produced : At other times, virus of this description has produced a pustule of considerable size, and one having a considerable degree of redness.

ness around the base, but which was, nevertheless, easily distinguished from cowpox. This pustule has an *elevated* centre, which gives it more or less the appearance of a common phlegmon; there is little or no hardness around its base, and the contained fluid quickly runs into suppuration, so as by the sixth day to contain well formed pus. After this, it quickly dries into an opaque crust, very different from that described as the common termination of the cowpox vesicle.

It must be confessed, however, that there is often considerable difficulty in distinguishing between an affection of this kind and that of the cowpox, as the former frequently exhibits almost every variety of appearance from that wished for to that of a common phlegmon. The most certain mode of judging on this point is, in my opinion, by a careful examination of the affection about the seventh day from inoculation, just before the proper period for the formation of the areola, and from observing the progress

progreſs of the affection after this period. By attending to what has already been ſaid, when deſcribing the progreſs of cowpox, great precision may be attained in judging of the nature of the affection produced, but in every caſe, where there is any material deviation from the general appearance and progreſs of the ailment, it ought to be a maxim to reinoculate the perſon until the whole proceeds regularly, or until we are perſuaded that the ſyſtem cannot be affected by the virus of cowpox in the way we would wiſh, when recourſe may be had to inoculation with the virus of ſmall pox; ſome ſuch obſtinate caſes I have met with in which repeated inoculations for cowpox have been conſtantly reſiſted; but I have not yet had an opportunity of ſatiſfying myſelf whether all theſe perſons would equally reſiſt the operation of the virus of ſmallpox. One of theſe perſons I had inoculated with matter of ſmallpox at the age of three months; the operation did not then produce the deſired effect, and the parents would not admit of his being reinoculated. About three years afterwards,

wards, I inoculated him at least six different times with the virus of cowpox, without being able once to produce an affection of a regular appearance. Sometimes the inoculated part inflamed for three or four days, and then every symptom gradually went off, without any appearance of a vesicle being formed: At other times, the affection would advance until the seventh day; but then it had every appearance of a common phlegmon, and contained pus.

Another instance has lately occurred where the constitution equally resisted the action of the virus of cowpox and of smallpox. This child was repeatedly inoculated, at the Institution, with the virus of cowpox; and although this was done at the interval of some months, yet no regular vesicle was ever produced, the appearances being much similar to those mentioned as the effect of the cowpox inoculation in the case related above: Lately I inoculated her with smallpox virus. The puncture
inflamed

inflamed for two days, and then a very considerable degree of hardness was felt on passing the finger over the part. This hardness continued for three days more, and then gradually disappeared. No pustule or vesication was produced.

It is to be observed, that in these cases, as well as in the others which I have found to resist the action of the virus of cowpox, the matter used for inoculation was taken at the period of the greatest activity, and produced the regular affection in other persons to whom it was applied.

In smallpox, immediately on opening the pustule, even by a small puncture, the whole of the contained fluid flows forth, and is easily obtained; It is not so in the cowpox, from the vesicle of which the best way of obtaining virus is the following:

At the proper period in the progress of the af-
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fection,

fection, as described above, make three or four punctures with the point of a lancet between the central crust and the margin of the vesicle, so as merely to penetrate through the cuticle; then wait for the space of a minute, during which a limpid fluid will be observed to exude from each of the punctures and to form a small drop. This is the proper virus for inoculation, and is to be carefully collected and preserved. By waiting a little longer, more virus will be obtained; and by going on in this manner, and gently pressing the vesicle occasionally with the side of the lancet, one pustule will be found to yield a very considerable quantity. But I have generally observed, that when an unusually great quantity of matter flows from one vesicle, it is proportionally less active than when the quantity discharged is small.

After a sufficient quantity of virus has been obtained, I always desire the surrounding parts to be lightly washed with cold water, in order to clear
away

away any matter which may have been left on them ; and a soft cloth dipped in the same to be applied to the vesicle to check the farther effusion of the virus.

If the discharge of fluid continues notwithstanding this application, a single drop of Goulard's extract, of the diluted vitriolic acid, or of some other astringent remedy, must be applied in order to restrain it, as there is a danger of the whole contents of the vesicle being discharged as fast as secreted, and thus the absorption and farther regular progress of the affection being compleatly prevented, or of the affection, from this circumstance, degenerating into a troublesome sore.

If the virus thus obtained is to be used for inoculation in the space of twelve hours, it may preserve sufficient activity although kept upon a common lancet, especially if the fluid is compleatly dried, by exposure to the air, before the lancet is put up. If, however, the virus is to be kept beyond

yond that space of time, before using it, I would recommend some other mode of preserving it, because it is wonderful how very soon a common lancet, loaded with cowpox virus, becomes rusty, and the virus of course decomposed; in which state, if the operation be performed, it will certainly prove unsuccessful, and bring disappointment to all concerned. This caution is the more necessary as although the inoculation, when performed with matter thus decomposed, will certainly fail of producing the desired effect; yet a considerable degree of inflammation will be occasioned by the rusty lancet, and acrid matter, which may cause a doubt for some days concerning the nature of the affection produced, or if the inoculated part inflames and advances to a state of suppuration, as frequently happens, it may be mistaken by those who are little accustomed to observe the regular progress of cowpox, for a properly formed vesicle.

Various are the modes which have been adopted
for

for preserving the virus of cowpox in an active state. In the essential points, however, all these modes are the same, viz. first in so preparing the fluid that it shall undergo the least possible change by fermentation, and then in securing it as much as possible from the action of the external air. The first of these points is effected by carefully drying the fluid by exposure to a gentle heat as soon as may be after it is taken from the vesicle. The second, by various contrivances, according to the substance upon which the virus is lodged.

The modes which I have found most convenient and successful for preserving the cowpox virus in a state of activity are the following :

The virus, when taken from the vesicle, is to be put upon a small piece of plain glass, and, by exposure to an atmosphere of a moderately warm temperature, allowed to become quite dry; another piece of glass of the same size is then to be put
over

over this, and the whole is then to be wrapped up firmly in a piece of tinfoil, of gold-beater's leaf, or of bladder damped with water, so as to exclude the air as compleatly as possible. This forms a neat thin package, which may be conveniently sent in a letter to any distance, and in this way the virus may be preserved for some months in a very active state.

Another mode, and that which I have generally followed, is to have a small phial made for the purpose, having a long stopper which reaches nearly to the bottom. This stopper is ground at the upper part, so as to fit the mouth of the phial as exactly as possible; and that part of it which is within the phial is formed into square surfaces which are numbered. Upon these squares the virus is lodged; and, when dry, is, with the stopper, put into the phial, where it is very completely secured from the action of the external air. In this way I have hitherto found the virus keep so well, that I think my success in inoculating, is more certain when done with

virus

virus which has been preserved in this manner, even for a week, than when done with it as taken immediately from the vesicle.

Some have thought it advisable to fill the phial, in which the virus is to be put, with a particular kind of air, *hydrogen gas*, in order to prevent any fermentation, and consequent decomposition of that fluid; but if care be taken to allow the matter to become perfectly dry before the stopper is thrust into the phial, there will be very little risk of any such process taking place, at least for a very considerable time.

The virus may also be preserved upon a quill, or upon a piece of cotton thread, both of which are, when dry, to be carefully secluded from the air in any manner which may appear most convenient and effectual.

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There is yet another way which I have lately discovered by which the virus of cowpox may be obtained and preserved in an active state, and fit for inoculation, which, at the same time that it is more convenient, promises also, from the trials which I have made, to be fully as successful as any of those which have been mentioned. It is by preserving the crusts which are formed from the inoculated vesicles of cowpox, dissolving a portion of these in water, and using this solution for inoculation in the manner afterwards to be mentioned.

At first it appeared to me that this mode of giving the cowpox might be liable to the same objections as are made to performing inoculation with virus taken from the vesicle at an advanced period of the affection. An attentive observation, however, of all the circumstances which take place in the topical affection during the latter stages of cowpox, and of the conversion of the inoculated vesicles into the
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femitransparent crusts, has served to convince me that my fears on this point were groundless.

It has been observed by authors, that, the fluid contained in the vesicle, in the advanced stages of cowpox, has undergone a certain change, whereby it is rendered unfit for propagating the affection, so as to give security from the smallpox; and this change is said to be marked by the puriform appearance which the fluid then assumes. The proper explanation of this appears to me to be as follows.

Very soon after the cowpox vesicle has attained its greatest magnitude, which is about the tenth day, the limpid fluid is entirely converted into the femitransparent hard crust; but the parts underneath this being still very tender, as soon as the peculiar inflammation from cowpox is gone, inflammation is frequently renewed in a different way, viz. by the irritation of the crust; and this soon terminates in the production of well formed pus.

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This circumstance I have frequently observed, and was at first not a little surprised to find a new areola formed very soon after the proper one had disappeared. On examination, however, I found that the inflammation in these cases was merely superficial, and that, on pressing the crust, pure pus was evacuated from underneath. I have also frequently observed a complete ring of pus around the properly formed crust about the twelfth day, which appeared to have been produced in the manner above mentioned, while the crust itself retained its peculiar character unaltered. From the above explanation of the formation of purulent matter in the latter stages of the affection of cowpox, the cause of the frequent failure to produce that affection with matter taken at these periods is obvious; for although some inflammation may be produced thereby for a few days, yet this cannot be expected to give security from smallpox.

With regard to the formation of the crusts; at-
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attention to the progress of the affection will show that a small vesicle is formed about the fourth day, and that on the fifth or sixth day a crust is formed in the centre of this vesicle, which can be nothing else than the limpid fluid concentered. By degrees, the size of the vesicle increases, more cells are formed, and more fluid effused into them; and in proportion as this takes place at the margin of the vesicle, the size of the central crust is also increased. The central crust, therefore, is not formed from a fluid which has been in a stagnant state during the whole course of the affection, and which might be supposed on this account to have undergone some change, or to have been converted into the state of purulent matter unfit for propagating the affection; but, on the contrary, is formed from the most active virus secreted from the fourth day, until the time of the vesicle having attained its greatest size; for this virus is every hour hardening into these crusts, in which state it seems incapable of further change, at least for a very considerable time.

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These observations concerning the frequent termination of the topical affection of cowpox, and the conversion of the vesicles into crusts, while they account for the frequent failure in communicating the affection by inoculation with the fluid found after the affection is on the decline, and for the puriform appearance of this fluid at that time, also confirm an opinion, that the crust is the real extractive matter, if it may be so called, of the most pure and active virus, secreted into the cells of the vesicle. If this explanation be admitted, it will readily be granted that, by dissolving these crusts in water, thus restoring what they had lost by exsiccation, and using this solution for inoculation, we obtain a virus in a pure and active state, and well suited for the propagation of the affection whereby itself was produced. That this is so in fact, I am enabled to state from the success of a great number of trials which I have made with virus of this description; and I can safely declare, that by inoculation performed with such virus, I have produced the affection

tion with as great certainty, and regularity in every respect, as with virus newly taken and used in the common way.

The very first crust which I used in this way for inoculation had been kept for a whole month, no otherwise excluded from the action of the air than by being loosely wrapped in a small piece of paper; yet four inoculations performed with it, on four different persons, took effect, and advanced as regularly as four other inoculations performed at the same time, and on the same persons, with recent virus.

I have since inoculated a great many persons with virus obtained from many different crusts, some of which had been kept for two months, and my success in producing the regular affection has been as great as by using virus which was obtained fluid from the vesicle.

I must here observe, that it was not the appearance

ance alone, of the affection produced by the virus obtained from the crusts, that was trusted as a sufficient mark of the antivariolous process in the constitution : Many of the persons thus inoculated were afterwards inoculated with the virus of smallpox, and were found completely unsusceptible of that disease.

Some caution, however, is necessary in choosing crusts for inoculation, in order to insure success equal to what I have experienced from the use of them. In the *first* place, it is absolutely necessary to ascertain that the topical affection, whereby they were produced, had been regular ; and, *secondly*, that the crust to be used is really that formed from the vesicle ; this is the more necessary to be attended to, as we frequently find that the proper crust, from being surrounded with purulent matter, or other causes, falls off at an unusually early period, and it then happens that another is quickly formed, but with qualities very different from those possessed
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by that which preceded it: without attending to this circumstance, one of these might readily be mistaken for the other, and much disappointment be thus produced, more especially as the second crust will also be found transparent from being formed of a ferous fluid. It is those crusts only which can be ascertained to have been formed from the vesicle after it has run through a regular course, and which, when separated from the part, are found, on examining them between the eye and a strong light, to be nearly transparent, which I would recommend ever to be used for inoculation. The best mode of preserving these crusts appears to me to be by putting them into a small phial with a well ground glass stopper, as soon as they fall off, and thus secluded them as much as possible from the action of the air: The particular manner of using them is much the same with that of using virus which has been dried upon glass, &c. and will be afterwards mentioned.

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Should this mode of collecting and preserving the virus of cowpox be found equally successful for inoculation in the hands of others as it has proved in mine, another important fact will be added to the practice of cowpox inoculation: As it will afford, in the first place, an easy way of obtaining virus in those cases where attendance cannot be given to take it at the periods recommended as the most proper, and from which circumstance the inoculation for cowpox has in many instances been suspended, and the smallpox allowed again to commit its depredations. It will, in the second place, afford an ample source of virus, as one crust will afford enough of it to inoculate many persons; and, in the third place, it appears to me that the virus, in the form of crust, will be better fitted for keeping in an active state than in any other way which has been recommended; and certainly it may, in this way, be very easily transported to any distance.

S E C T. IV.

Of the different Modes of inserting the Virus.

FOR performing the cowpox inoculation, the virus may be used either in a fluid state, as it is immediately taken from the vesicle, or after it has been preserved for some time in any of the ways above mentioned.

In the former case, it has been recommended, on taking the virus from the vesicle, immediately to insert it in as fluid a state as possible, by scratching

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the skin with the point of the lancet until this becomes tinged with blood ; and it is enjoined, that the lancet be held nearly in a perpendicular direction, in order that the virus may by its own gravity fall more directly into the wound.

This mode of performing the inoculation, I have, however, found very frequently to fail ; and, on considering the subject, I am inclined to attribute this failure to the following causes. When the matter is very fluid, as it always ought to be when issuing immediately from the vesicle, such a degree of repulsion takes place between this and the polished surface of the lancet, that the smallest touch, even that of gently scratching the skin, is sufficient to make it start from the point of the instrument, which is then left quite clean. Again, I have observed, that when the virus is applied in the manner above directed, or to the surface of the skin where the cuticle has been just abraded, that instant in which it touches the wound a great discharge of blood immediately

mediately takes place, much greater, indeed, than from the application of any other thing, under similar circumstances, with which I am acquainted. From this extraordinary effusion of blood, I apprehend that the virus is often either completely washed away, or what remains is included in the coagulum or crust which is formed upon the part, without ever touching the skin, so that no effect can in consequence be produced.

After trying this method as recommended by Dr Woodville, and finding it very often fail in producing the desired effect, I used an instrument formed like a blunt lancet, with a few fine teeth upon the shoulder: With these the cuticle was merely abraded, and the virus applied; but it was curious to observe, on the application of the virus, how instantaneously a most profuse hemorrhage, in proportion to the wound, always took place. However gently this instrument was used, I found my
operations

operations equally unsuccessful, and it is apprehended from the same causes, as before.

The above causes of the frequent failure in procuring the insertion of the cowpox matter having occurred to me, the following plan for conducting that operation was adopted, which, I am confident, has been attended with more success than any other of which I have made trial.

When the person to be inoculated is in the same room, or even in the neighbourhood of the one from whom the virus is taken, I use a common lancet.

I take the virus from the vesicle in the manner mentioned, and with the point of a pin, or of another lancet, take care that it is kept completely to the point of the instrument, until such time as it becomes glutinous, or of such a consistence as not easily to be wiped off. Thus armed, I introduce
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the lancet at the place determined on for inoculation, about the eighth part of an inch, merely under the cuticle, and retain it there for a few seconds; when the lancet is withdrawn, I wipe it, as it were, by pressing upon the parts underneath, whereby the viscid virus is separated from the side of the instrument, and very certainly lodged in the wound.

In several instances where a small piece of adhesive plaster was applied over the part inoculated, and allowed to remain for two days, a degree of ulceration was uniformly produced, and the virus seemed to be entirely thrown out of the wound, as no vesicle was afterwards formed. In consequence of this, I now never make any application to the part after the operation, but recommend it to be freely exposed to the air until the hæmorrhage stops, and then I allow the part to be covered, or remain exposed, as it had been before.

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In children, whose skin is of a delicate texture, I have frequently observed a very considerable degree of redness extending in a circle around the punctured part, in the space of two or three minutes after the inoculation had been performed. This appearance exactly resembles the inflamed spot formed around the part which has been stung by a bee, and, according to my observations, indicates certain success from the operation.

When about to inoculate with virus which has been preserved for some time, whether in the usual way or in the form of crusts as above mentioned, it is necessary to reduce it again to a semifluid or viscid state. For this purpose, the smallest drop of water is to be put upon the dried matter, and carefully incorporated with it until the whole becomes one uniform mass. It may be necessary to add here, that when the crusts are to be used for inoculation, a small bit only, such as may be reckoned sufficient to supply matter for the
number

number to be inoculated, should be dissolved at a time, and the remainder still preserved in the dry state. Unless this is attended to, some change may be produced by the frequent solution and exsiccation performed before the whole crust be expended, which will diminish the efficacy of the virus. The portion of crust to be used will be found most easily reduced into a proper state for inoculation, by allowing it to remain, upon a small piece of glass, for a few minutes covered with a single drop of water; when it is somewhat softened by this means, it is then to be bruised and reduced into an uniform mass with any convenient instrument, as the flat side of a knife or shoulder of a lancet. It will be observed, that the mass, which is thus formed, assumes a white appearance, as if mixed with pus. This appearance, however, I apprehend is rather to be attributed to the presence of that portion of cellular membrane which formed the cells of the vesicle than to any real admixture of purulent matter. A little of the

matter

matter thus prepared is to be put upon the point of the lancet, and kept there until it becomes again so viscid as not easily to be rubbed off; the operation is then to be conducted in the same manner as when using virus taken immediately from the vesicle.

When the virus is preserved upon a piece of thread, as is frequently done, a slight incision is made in the part fixed on for the inoculation, and a small piece of the thread is put directly into it, and secured there by means of a slip of adhesive plaster. This is a mode of inoculating for cowpox which I conceive to be very uncertain, on account, as has already been observed, of the great propensity in the part to ulcerate, especially when covered with adhesive plaster.

In performing cowpox inoculation, I seldom make more than one puncture, preferring rather to repeat the operation in the course of a few days than to
double

double the severity of the ailment. In cases, however, where the accession of smallpox may be dreaded, from exposure to the contagion of that disease, two punctures, in order to give a greater probability of the inoculation taking place, may perhaps be made with advantage, but it ought always to be a rule to make them at such a distance from each other as that the areola of each, when fully formed, may be quite distinct or separate.

After the virus has been inserted, I have known it lie in the part for fourteen days without giving any appearance of having taken effect; and yet, after this period, the affection has advanced regularly through all its stages, without any new inoculation having been performed: Such cases, however, are always to be considered as uncommon, and their progress must be very narrowly watched.

S E C T. V.

Of the regular progress of the Local and Constitutional Affections of Cowpox.

ANOTHER circumstance of much importance to be attended to in conducting the inoculation of cowpox, that society may reap all the advantages which can result from that operation, is to ascertain that the whole affection proceeds through a regular course. This regards, 1st, the local affection, or state of the part where the inoculation
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has been performed, and, *2dly*, the general or constitutional affection.

1st, Of the Local Affection.—The whole of the phenomena attending the regular progress of cow-pox, as they appear at the part where the inoculation is performed, have already been described; I shall here, therefore, only recapitulate the appearances which may be observed at four stated periods in the progress of the affection when regular; appearances with which it is, in my opinion, absolutely necessary that every person who undertakes to conduct this new inoculation should be familiar, and should positively ascertain, by actual examination, before he can give a decided opinion concerning the regularity of the local affection.

The first of these periods is about the end of the third, or beginning of the fourth, day from the time at which the inoculation was performed, when a small inflamed spot may be observed at the
part

part where the virus was inserted, which, on passing the finger over it, is found to be elevated and hard.

The next period is about the end of the seventh day. At this time, the vesicle is of considerable magnitude, of a circular or oblong figure, according to circumstances, having a turgid well defined margin, and a considerable depression in the centre, where a small crust is formed, appearing to fix the central part to the parts underneath. The less redness and hardness around the base of the vesicle until after this period, the more truly is it characteristic of the regular cowpox affection.

The third period at which it is necessary to examine the progress of the cowpox affection, in order to form a judgment of its regularity, is about the end of the tenth day. At this time the vesicle has attained its greatest magnitude, the central crust is much enlarged, and the margin of the vesicle appears
very

very turgid, and divided into minute cells or vesicles, containing a watery or transparent fluid. The surrounding inflammation is now very considerable, and extends in a circle of from half an inch to one inch and a half in diameter. Close upon the vesicle, this inflammation is very deep coloured, approaching to livid, and the parts underneath feel very hard and tense. At this time also some hardness and swelling of the glands in the armpit is generally perceptible.

The fourth period for the examination of the cowpox affection is about the end of the thirteenth day; then the surrounding inflammation has entirely disappeared, and the part where it was has a dingy yellowish appearance. The hardness which was felt around the vesicle at the last examination is also entirely gone, and the whole of the vesicle, with its contents, is formed into a hard crust or scab.

This crust appears elevated entirely above the skin
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of the surrounding parts, is of a reddish colour, and, being formed from a pellucid fluid, is nearly transparent.

2d, Of the General or Constitutional Affection.—

Dr Jenner has declared, that it is only those who have undergone the constitutional, as well as the local affection of cowpox, who are rendered unsusceptible of smallpox by the new inoculation: It becomes, therefore, a circumstance of the very first importance, in conducting the inoculation for cowpox, to be able to ascertain the presence of the constitutional affection. In many cases this, by a little attention, is easily accomplished; for soon after the areola begins to be formed, that is about the eighth day, the person becomes hot and feverish, and continues so for one or two days; and this feverish state is more or less plainly marked according to circumstances. In other cases, however, and these, according to the accounts given by authors, by far the most numerous, no fever can be detected; and

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no other symptom, independent of the appearances of the local affection, which we shall afterwards find may be deceitful, has been mentioned, whereby we may judge concerning the presence of the antivariolous process in the constitution. In children, who are the most frequent subjects of cowpox inoculation, this absence of fever has been particularly noticed, it being remarked, that by far the greater number of them pass through all the stages of cowpox without any sickness being observed.

If the local affection of cowpox has proceeded regularly through all its different stages; and if each stage has been clearly and distinctly marked, we think ourselves authorised, from the united testimony of many eminent in the medical profession, to conclude, that the general affection, and, consequently, the antivariolous process, has taken place in the constitution, even although no fever may have been detected. But in many instances these different stages are not regular, neither are they distinctly marked ;
and

and how far these irregularities may take place without frustrating the purpose of the inoculation, and what may be the exact degree of the size of the vesicle, or of the surrounding inflammation and hardness, which is to mark a constitutional affection, or to assure us that the antivariolous process has been accomplished, we must confess we have no certain rule to determine. On this point, then, assuredly the most important to be ascertained in the progress of the symptoms of cowpox, every person is left to form his opinion from a comparison in his own mind of the case under consideration with what he may have read in the writings of authors, or with what he may have observed in other cases which, to his own knowledge, had proved effectual. But it will be allowed, that a judgment thus formed must often be very inaccurate, and thus bring disappointment, or worse, to all concerned, as well as discredit upon the new inoculation.

Again, it frequently happens in the inoculation for smallpox, that the part inoculated inflames, and

a pustule comes to be produced which contains virus in a pure and active state, capable of exciting the disease in others, without the person himself undergoing the constitutional disease of smallpox; or being, by the presence of this pustule on his body, rendered unsuceptible of variolous contagion at a future period.

The following history, related by Mr Dawson in the Transactions of the College of Physicians in London, Vol. III. at page 385, illustrates this: “ Last spring, (1772) I inoculated two children in one family; on the third day, there was a slight inflammation around the places of incision; on the fifth day, it was considerably increased, and the places felt hard on being pressed by the finger. I saw them again on the seventh or eighth day, and then the inflammation was much increased, extending nearly to the breadth of half-a-crown. Upon my applying a gentle pressure to the inoculated places, matter issued out of them; with which, as

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it issued from the arms of both patients, I perfectly saturated a cotton thread. With this thread I inoculated nineteen persons; every one of them had a fever and eruption of pustules at a proper time. But the children from whom the matter was taken did not sicken as was expected, and, on the eleventh day, the inflammation upon their arms was considerably abated; and two or three days after this, there remained nothing but a dry scab. Agreeably to the general opinion of the faculty, I told the parents that their children were secure from future infection of the smallpox. They, however, insisted upon their being inoculated again, which was accordingly done in the arm of each. Contrary to my expectation, their arms began again to be inflamed, and went on in the same manner as they had done before, till about the ninth or tenth day, when they sickened, had a smart fever for three days, and then an eruption of a considerable number of variolous pustules *.”

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* See also several similar cases related by Mr Kite in the *Memoirs of the Medical Society, London*.

Here the local affection, though in itself perfect, had failed in communicating its influence to the constitution; and if this can take place in the cruel disease of smallpox, how much more readily may it be believed to take place in the mild ailment of cowpox. Such an instance as this occurring in cowpox, would form a case in which we have no guide to direct us; nay, the very symptoms we have been taught to trust as a sufficient mark of the presence of the antivariolous process, viz. regularity in the local affection, would appear only to mislead us. But that this is no idle conjecture, or painting of cases which analogy alone might lead us to dread, is proved from the writings of those most conversant with our subject. Dr Jenner, himself has given us a case to show that, even in the casual inoculation, which is allowed to be the most severe way in which the ailment is communicated, the action of the virus of cowpox may be merely local. “ Elizabeth Sarfanet lived as a dairy maid at Newpark farm in this parish. All the cows and
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the servants employed in milking had the cowpox ; but this woman, though she had several fores upon her fingers, felt no tumors in the axillae nor any general indisposition. On being afterwards exposed to variolous infection, she had the smallpox in a mild way. Hannah Pick, another of the dairy maids who was a fellow servant with Elizabeth Sarfanet, when the distemper broke out at the farm, was at the same time infected ; but this young woman had not only fores upon her hands, but felt herself also much indisposed for a day or two. After this, I made several attempts to give her the smallpox, by inoculation, but they all proved fruitless *.”

There are other instances also recorded, in which the action of the virus of cowpox has been merely local ; and the following case, in which the virus of cowpox acted locally only, is so clearly marked, and so similar to the history related above concerning smallpox, that I must here beg leave to insert it. The case

* Vide Inquiry into the causes and effects of the Variolae Vaccinae, 2d edit. page 61.

case is mentioned in a letter from Dr Harrison to Sir Joseph Banks, and by him communicated to Dr Batty. “Upwards of twelve months ago, the nursemaid and two children of my friend, the Reverend Marmaduke Allington of Swinop-house, were inoculated for the cowpox, with matter which had been sent from a great distance. Neither of the infants were infected, but the maid had considerable inflammation on the arm, and although it was not attended with indisposition, she remains insensible to the variolous impression. From the nurse were inoculated a female servant, a third child, and Miss Fanny Allington, who was then about five months old, had the operation repeated. The servant did not take the cowpox, but the children were supposed at the time to pass through it in an easy manner. Though I did not see any of the patients before they were inoculated for the smallpox, I had frequent conversations on the subject with the attending surgeon, Mr Sexty, who was always doubtful and dissatisfied with the experiments. From him, and some other respectable friends who
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have carefully inquired into the phenomena, I am informed, that in Fanny's arm the progress of the pustule was unusually rapid, and was characterised by an areola, that was neither extensive nor circumscribed. Mr Sexty is an accurate and respectable practitioner, but on account of other avocations, and his distant residence, the patients were only visited occasionally ; and as there was no constitutional indisposition, Mr Allington paid them no particular attention. From these causes, the appearances on the incised parts cannot be minutely detailed, but I think a sufficient number of circumstances may be collected to enable us to come to a satisfactory conclusion on the subject. In both children, the incised parts were inflamed, and a fluid was produced, but they had neither eruption nor illness. With matter taken from the arm of Fanny, the maid was again exposed to the vaccine disorder. From her several others were infected, and, when the cowpox had been propagated through different subjects, Mr Allington's other child was likewise inoculated.

inoculated. Six months afterwards, they were all exposed to the variolous inoculation, and Fanny took the disorder. She had a mild smallpox, with a moderate eruption. Hence it appears that Fanny communicated a security against the smallpox to others although she herself remained liable to its influence *.”

Since the foregoing pages were put to the press, and while yet correcting the proofs of the present, I have had an opportunity of examining two cases in which the smallpox have appeared after the children had apparently undergone the cowpox affection; and I shall here state the particulars of these cases, in so far as I have been able to collect them.

J. M. was inoculated at the Institution in October last: on the third, seventh, and tenth days from inoculation, the local affection appears, from the books
kept

* See Medical and Physical Journal for February 1801, p. 109.

kept at the Institution, to have advanced regularly, but the child was not brought back for examination on the fourteenth day as is usual. About the middle of March following, this child is said to have been infected with the natural smallpox, which were then in its neighbourhood; as, after three days of smart fever, she had an eruption of about three dozen of pustules over her body; which pustules, from the description of the mother, remained out seven days, suppurated and dried into crusts. Another child, living in the same house, but who had not been inoculated for cowpox, sickened about the same time as J. M. and had a very numerous eruption of smallpox. On the 30th of March, that is about a fortnight after they were first taken ill, I saw both these children. On the body of J. M. there were many red marks remaining, but all the crusts had fallen off several days before: On the body of the other child a vast number of crusts remained, and left no doubt in my mind concerning the nature of the disease under which he had laboured. From the description
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of the mother of J. M. I was at first inclined to believe, that the disease with which that child had been infected was the chickenpox; but she, the mother, afterwards asserted that she well knew the smallpox, and was convinced that her child had the true kind; and this opinion is the more entitled to credit, that, upon minute inquiry, I could find no traces of the chickenpox in the neighbourhood; and that a brother of this child, who formerly was infected with the smallpox, but who never had the chickenpox, has not been infected with the latter.

The other instance alluded to, of the smallpox supervening after inoculation for the cowpox, is in the child of Mr B. This child had been inoculated for the cowpox upwards of twelve months ago; and in proof that the local affection advanced regularly, Mrs B. informs me that virus was taken from the vesicle for the inoculation of other children, and she was assured that the state of the affection was then such as to give hopes that the desired effect would be

produced by the inoculation. Some time afterwards, a younger child in the same family was also inoculated with the virus of cowpox, and went through the ailment regularly. Lately both of these children were inoculated with the virus of smallpox. The variolous inoculation on each advanced regularly; and, on the eighth day, the one who had been first inoculated with the cowpox, became hot and feverish; on the ninth day he had two fits, which were soon followed by an eruption of pustules; and these pustules were every way characteristic of the smallpox when I examined them on the twelfth day from inoculation. At this time the inoculated affection on the arm of the youngest child was evidently fading and drying up, although very considerable vesiccation and surrounding inflammation, to the extent of the size of a sixpence, was still observable.

On making inquiry at the mother and nurse, I found, that the areola of the cowpox affection on
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the arm of the oldest child, who now had the smallpox, had not proceeded to nearly so great an extent as on the arm of the youngest, who compleatly resisted that disease. The surgeon, who inoculated the oldest child for cowpox, being immediately afterwards confined by sickness, did not see the progress of the affection, and I have not been able to trace what other children were inoculated with the virus mentioned by the mother to have been taken from her child. The eruption of smallpox is favourable, and the child doing well.

Such then are the particulars of these two cases, as far as I have been able to trace them; and although they may at first sight appear adverse to the opinion entertained concerning the antivariolous power of cowpox, and to the practice of the new inoculation, as a substitute for the smallpox; yet, on a serious consideration of the subject, they certainly do not warrant such inferences.

It has been ascertained beyond a doubt, and promulgated on the authority of the first medical men in the world, that when the human constitution has undergone the specific action excited by the virus of cowpox, the person is afterwards secure against all future attacks from smallpox. This fact, as a general rule, both Dr Farquharson and myself (and all others who have witnessed the antivariolous powers of cowpox even in a few instances), are bound to believe; for our investigations on this subject have afforded, as has already been observed, many and satisfactory proofs, in other cases, of the efficacy of cowpox as a sure preventive of smallpox: thus, besides those who have been inoculated by us with the virus of the smallpox, after having undergone the cowpox, and who have been thus proved to be unsusceptible of that disease, we have often found, that children, who had been inoculated for the cowpox, have eat, slept, and been constantly with those infected with smallpox in all the stages of this disease, and often in its very worst form,

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yet have remained completely insensible to its attacks. If, then, it should unfortunately happen, that the cowpox affection in some few instances, although it may have been apparently regular in the progress of the local affection, be not attended with the desired and usual effect, are we, from such instances, entirely to discredit the antivariolous power which is generally imparted to the constitution by the inoculation of cowpox? Certainly not; such instances should be regarded only as pointing out to us the necessity of investigating those causes which may thus operate in producing exceptions to the general rule, in order that they may be obviated.

It is well known, that the human constitution will resist the contagion of smallpox at one time, even although the person has not formerly been affected by that disease, and at another time suffer severely from its attacks. Similar causes may exist in the constitution, and render a person unsusceptible for a time of the particular action of cowpox ;
and

and these causes, or others, may so act as to render the inoculation of cowpox, though, with regard to the local inflammation, it may appear perfectly regular, merely a local affection. Instances of this kind have already been detailed above; and it is thought that inattention to this circumstance, viz. that the action of the virus of cowpox may be often merely local, has been a fruitful source of error and disappointment in conducting the new inoculation. These instances of the mere local action of the virus of cowpox, which have been mistaken for the regular constitutional affection, very forcibly point out a desideratum, viz. *a test of a constitutional affection*, in conducting the inoculation of cowpox.

Having pointed out the difficulties which frequently present themselves in forming a judgment of the efficacy of the affection produced by inoculation with the virus of cowpox in preventing the smallpox, I would next observe, that if, on the one hand,

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we judge that the cowpox affection has been complete, when it has been only local, the person will still be left exposed to all the horrors of the natural smallpox, which a false judgment given, of absolute security from that disease, had taught him to despise. And if, on the other hand, we judge that the cowpox affection has been merely local, when it has in reality been general, we are induced to repeat the inoculation again and again; and as the appearances of each of these reinoculations will vary, and neither a regular vesicle, nor fever ever be produced, the same uncertainty will still remain, until at length the inoculation for smallpox itself comes necessarily to be performed. This, however, may not be consented to, before both the operator and the patient have experienced much trouble and anxiety, and are completely disgusted with the uncertainty arising from the inoculation of cowpox.

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An opinion too commonly adopted, that the conducting of the inoculation for cowpox is of so trifling a nature, as scarcely to deserve the attention of medical men; and that the affection, as being more safe and easy for the patient than the inoculated smallpox, may be given by any one, has also tended much to bring discredit upon the efficacy of this new inoculation. From this circumstance, persons, little acquainted with the affection, have yet engaged to conduct the inoculation of cowpox, and have brought disappointment and misery to all concerned. I have lately been informed, that the greater part of the children in two parishes in Scotland were inoculated in this way, (certainly with the best intention on the part of the operators), but the result was, that the smallpox came among them soon afterwards, and every one thus inoculated became affected with that dreadful disease, while those few that had been inoculated by persons acquainted with the appearances in cowpox entirely escaped.

Although

Although, therefore, the inoculated cowpox may, indeed, *as a disease*, be regarded as trifling, and little deserving the attention of medical men, yet as a certain preventive of one of the most loathsome and fatal distempers which affect the human race, it is of much importance, and highly deserving of the most minute attention from those who undertake to superintend its progress. The smallpox, communicated by inoculation, is easily distinguished from all other diseases, and there it is also easily known whether the affection has been constitutional or merely local; and therefore it is properly thought that operation may be conducted by people little accustomed to accurate observation on medical subjects. But until there be pointed out, and generally known, some unequivocal mark of a constitutional affection, which does constantly occur during the course of cowpox when effectual, and which may be as easily distinguished as the fever and eruption consequent to the inoculation for smallpox; this new inoculation ought certainly to be performed by those

alone who are well acquainted with every appearance of the ailment : For as much as it is more difficult to distinguish between the cowpox and some other affections, and also clearly to ascertain the presence of a constitutional affection, than to form a similar judgment in the inoculated smallpox ; the more does this new inoculation require attention to every symptom which may occur during its progress, in order that mankind may reap every advantage which has been promised from a general introduction of cowpox as a preventive of smallpox.

From the very first time that I had occasion to conduct the inoculation for cowpox, the uncertainty of the desired change being operated upon the constitution, partly from the apparent flightiness of the local ailment, but chiefly from a want of some well defined mark whereby to judge of a general affection, very forcibly presented itself to my mind ; and after having carefully attended to upwards of

six hundred cases which have fallen under my immediate care, I am thoroughly convinced, that some clear and well defined mark of a constitutional affection in cowpox, different from what has hitherto been observed by those who have written on this subject, is still to be regarded as the grand desideratum in conducting this new inoculation: for until this be established, our judgment of the efficacy of the cowpox inoculation in preventing smallpox must often be formed with doubt and anxiety, and too frequently prove ultimately erroneous. The truth of these remarks will be best known to those most conversant with the cowpox inoculation, and who are accustomed to observe the great variety of appearances which the local ailment often assumes.

For some time after the introduction of the cowpox inoculation into medical practice, many cases were related in which an eruption of pustules, more or less numerous, was said to take place, similar to what happens in smallpox. While these reports

ports were propagated, and certified by men who seemed worthy of credit, even although no instance of the kind had come under my own observation, I entertained hopes of so conducting the new inoculation in every case as to obtain a certain and well defined mark of a constitutional affection: for if an eruption of pustules belonged to cowpox in any case, as a consequence of the peculiar fever or constitutional ailment thereby induced, I thought that one or two pustules might be made to appear in every case. It is well known, that, by irritating any part of the skin by the application of heat, of a stimulating plaster, or various other substances, we can produce a greater number of pustules in small pox upon that particular part than would otherwise have appeared; and, judging from analogy, I expected that the same thing might have been effected in cowpox. Such trials I have made; and although they were conducted with as much anxiety and care to produce pustules, as other persons seem to have taken to avoid producing them,

them, yet they have constantly failed; nay, these trials have now been made under such a variety of circumstances without effect, as to confirm me in the opinion, that an eruption of pustules, as a consequence of a constitutional affection, does not belong to cowpox.

Foiled in my attempts, so to conduct the inoculation of cowpox as to produce pustules, I recollected some experiments which had been made with regard to the inoculation of smallpox. It was found, that if the same person was inoculated every day until the fever induced by the first inoculation supervened, all the other punctures quickly advanced in their progress; and that, in the course of a day from the time the fever or general affection began, even that puncture which had been last made, perhaps only twenty-four hours before, equalled in maturity the one first made, perhaps eight or nine days before, and from which the fever had arisen.

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In this case, it appears to me evident, and I think must be admitted by every person, that even had no other pustules appeared on the body than those occasioned by the repeated inoculations, nay, had there even been no fever observed in consequence of the inoculation, yet as the pustule occasioned by the last puncture had been suddenly accelerated in its progress to maturation, at the time the general or constitutional affection should have appeared, this alone was a sufficient proof of the variolous action in the system.

Judging again from analogy, I expected that the same thing, which thus happened in the smallpox inoculation, might also take place in that for the cowpox; and the unexpected appearance of one or two vesicles upon children that I had inoculated, which vesicles were quite characteristic of the ailment, and the appearance of which I could only account for from a second and accidental inoculation during
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the course of the disease, as mentioned page 106, strengthened my hopes. And certainly, if we find in cowpox, where the inflamed and hard areola does not take place, at least in the regular course of that affection, until the end of the seventh or beginning of the eighth day from inoculation, that a second inoculation, performed for example at the end of the fifth or beginning of the sixth day, is so much accelerated in its progress, about the time the general affection of the system usually takes place, as to have an areola formed within a few hours, or very shortly after the first, and that this areola increases with the first, and again fades at nearly the same time, we must be struck with the similarity, and forcibly led to draw the same conclusion in the one case as the other, viz. that although the inoculated affection had appeared very slight, and no fever had been observed, yet that a certain action had been excited in the constitution. That this was the true constitutional affection of cowpox, may be judged by the acceleration of the

second

second vesicle to a state of maturity, five days before this could have happened had there been no consentaneous general action or change in the system.

The truth of this opinion was also soon put to the test of experience ; and I have now much satisfaction in declaring that the result appears to answer my most sanguine expectations.

I shall, therefore, lay before my readers, for their consideration, some of the particulars of my observations on this important point ; and I trust, the evidence to be offered will justify me in asserting, that by a second inoculation, performed at a certain period in the progress of cowpox, a clear and well defined mark of a constitutional affection may be obtained in every instance in which the ailment is effectual. I shall, in the first place, detail several cases in which the double inoculation was performed, with such remarks as were noticed at the time ; and
then

then give some plates exhibiting a comparison between the primary and secondary vesicles, which have been executed by very accurate artists.

FIRST CASE.

W. C. was inoculated for cowpox at the Institution, on the 28th November, by one puncture in the left arm. On the 2d December, the infection having taken place and made considerable progress, he was reinoculated in the other arm.

From inattention of the parents, this child was not brought back until the 12th; at which time there was scarcely any perceptible difference between the appearances on the arms, and both affections were dried into the proper crust. On examining the mother, I was told that the inflammation around the base of each vesicle had begun and

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faded at nearly the same time, and that both affections were at the height on the tenth day from the first inoculation.

SECOND CASE.

R. M. was inoculated at the Institution on the 2d December, by one puncture in the left arm, and, four days afterwards, by another puncture in the right arm. This child was not brought forward again for examination until the 12th; at which time the affection on each arm appeared to be at the height, and both were quite characteristic of cowpox. The mother informed me that the redness around each vesicle had begun on the same day, and at the time of examination, no difference, with regard to the maturity of the affections, was observable.

THIRD

THIRD CASE.

W. G. was inoculated on Thursday the 10th December, at noon, for cowpox, by one puncture in the left arm.

15th, The inoculation having taken effect, and the vesicle having advanced regularly, he was this day, at noon, again inoculated, from the same stock of virus, in the right arm.

17th, The vesicle of the first inoculation has advanced regularly, and the inflammation is just beginning around its base.

The second inoculation shows every appearance of having taken effect.

19th, The appearance of the first inoculation is quite

quite regular; and the hard and inflamed areola is very complete.

The vesicle of the second inoculation is of the size of one at the end of the fourth day, but has a well formed areola around it, of the size of a sixpence, with considerable hardness. The redness around this second vesicle was observed last night at bed-time, so that it must have begun in little more than three days from the time of inoculation, and nearly four days sooner than it began to appear around the vesicle of the first inoculation, or than is usual in the regular cowpox affection.

20th, The vesicle of the first inoculation is perfectly characteristic, and the central crust is increasing. The inflamed and hard areola is evidently at the height, and about the size of half-a-crown.

The vesicle of the second inoculation appears very little, if at all, increased since yesterday; and there is

a central crust forming. The areola is more inflamed and hard than yesterday, and also rather larger, giving the whole the exact appearance in miniature of the cowpox affection on the ninth day when regular.

21st, The vesicle of the first inoculation is nearly all converted into crust, and the areola has faded much.

The vesicle of the second inoculation is still about the same size; the areola more red and hard than yesterday. The child was observed to be a little fretful in the night, but no increase of heat was perceived by the nurse.

22d, The vesicle of the first inoculation is completely dried into the characteristic crust, and the areola quite gone. The vesicle of the second inoculation is still of nearly the same size, and appears white around the central crust as on the tenth day in the regular affection.

affection. The redness and hardness of the areola are greatly diminished since yesterday. Twelve complete days from the first inoculation, and seven since the second.

23d, The crust of the first inoculation is quite firm. The vesicle of the second inoculation is nearly dried into a crust, and the surrounding inflammation and hardness almost gone.

24th, The crust of the first inoculation still firm and quite characteristic.

The vesicle of the second inoculation is also formed into the characteristic crust, which is in size equal to about one-sixth part of the first. The areola was completely gone at bedtime last night.

Thus it appears, that the areola of the first affection began to form about the beginning of the eighth

eightth day, and the areola of the second about the beginning of the fourth day, from the time of their respective inoculations; that they advanced to maturity, and faded at nearly the same time; so that the first ran its course in thirteen days, while the affection from the second inoculation finished its course in about eight days. The progress of the second inoculation has therefore been accelerated five days before that of the first, and before what is common in the regular cowpox affection.

FOURTH CASE.

W. P. was inoculated on the 16th December in the left arm with the virus of cowpox.

23d, The vesicle is advancing. This being the end of the seventh day, and as yet no areola beginning to appear, I inserted virus, which was taken from the vesicle on the left arm, into the right arm, and also virus taken from another child into the
same

same arm, viz. The upper puncture being made with virus taken from the left arm; the lower puncture with virus taken from another child.

26th, An areola began to appear around the first vesicle only last night, which is considerably more late than usual, being nearly the middle of the tenth day from inoculation; it is now well formed, and the affection quite characteristic.

Both secondary punctures feel hard, and there is a considerable degree of redness around them, which was first observed this morning, *i. e.* in rather less than three full days from the time of inoculation.

28th, Areola of the first inoculation large, and very complete.

Two very small vesicles are now formed on the secondary punctures, each of these however has a well formed areola, nearly of the size of a shilling;
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and, on examination with a glass, these vesicles appear perfectly characteristic of cowpox. Both first and second inoculations appear, from the areola, to be this day at the height. The child was fretful last night, but not hot.

The lower vesicle of the second inoculation appears considerably larger and farther advanced than the upper one.

28th, The areola of the first inoculation is faded, both with regard to redness and hardness. The progress of the vesicle is regular.

The two vesicles of the second inoculation rather larger than yesterday; and the lower one still larger and more advanced than the upper one; both central crusts increasing, and the areola around them evidently declining. The secondary inoculations have, therefore, been accelerated to maturity, at least five days before the usual progress of cowpox:

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and, judging from the first appearance of the areola of each, at least seven days and a half before the first inoculation, and the areolae of each has appeared, arrived at its height, and again faded about nearly the same period.

29th, The inflammation and hardness was entirely gone from the first inoculation last night at bed-time, and the vesicle nearly dried.

The areola is gone from the vesicles of the secondary inoculations this morning, and these vesicles are both drying fast also.

30th, All the vesicles are dried into the proper crusts.

FIFTH CASE.

A. W. A. was inoculated on the 13th February, by one puncture in the left arm, with virus obtained by dissolving a portion of a crust which had separated from an inoculated cowpox vesicle about six weeks before, and which had been preserved by being merely wrapped in paper.

19th, The infection had taken place, and he was this day inoculated in the right arm with virus taken from the vesicle upon the left, which vesicle had quite the characteristic appearance of cowpox.

20th, The vesicle of the first inoculation is advancing regularly, and some hardness is perceptible around it.

The part punctured yesterday, is slightly red.

21st,

21st, An areola began to form around the first inoculated affection late last night, and is now very distinct.—A minute vesicle has formed on the part last punctured, and considerable redness has appeared around it this morning,—no heat or restlessness has been observed.

22d, The primary affection advances regularly. The vesicle of the second inoculation is rather larger than yesterday, and the areola is well formed. The whole affection appears equal in size to about one-sixth of the first inoculation.

23d, The areola of the first inoculation is much faded, and the central crust is increasing. The areola of the second inoculation is also fading, and the vesicle drying.

25th, Both vesicles entirely formed into the proper crusts. No heat nor restlessness have been observed on the child during the whole course of the affection.

Many

Many more cases might here be detailed, in which a second inoculation with the virus of cowpox was performed several days after the first, and in which the acceleration of the second vesicle, to maturity, was in every respect as regular as those above mentioned; but it is thought, that those already given may be sufficient to illustrate the general fact—That if, during the regular progress of cowpox, a second inoculation be performed a certain number of days after the first, the affection produced by this second inoculation will be accelerated in its progress so as to arrive at maturity, and again fade at nearly the same time as the affection arising from the first inoculation; and that this will take place although the constitutional affection be so slight as otherwise to pass unnoticed.

Having ascertained this important fact, the next thing to be considered was, how to apply it in practice so as to be productive of the greatest advantage in conducting the inoculation for cowpox. The

desideratum

desideratum was *a clear and well defined mark* of a constitutional affection which should appear in every case in which the inoculation was effectual ; and it appears that this may be obtained by performing a second inoculation at such a period as, on the one hand, to afford the greatest contrast between the duration of the topical affections produced by the first and second inoculations ; and, on the other hand, to obtain the topical affection of the second inoculation distinctly marked with the peculiar character of cowpox. For the purpose of ascertaining the most proper period at which to perform the second inoculation, that the test might be obtained in the greatest perfection, the virus was inserted, the second time, in the following cases at different periods of the first affection, and the phenomena resulting were carefully observed.

SIXTH CASE.

M. D. was inoculated on the 9th January with virus of cowpox. The affection has advanced regularly; and this day (the 14th) she was reinoculated in the right arm with virus from the vesicle on the left.

15th, The first inoculation is advancing well, but as yet no areola is observed.

The second inoculation is a little red.

A third inoculation was this day performed with virus from the vesicle on the left arm.

16th, The first inoculation is advancing, and some inflammation is now appearing around the base of the vesicle.

The

The second inoculation is a little red, and feels somewhat hard on passing the finger over it.

The third inoculation a little red, but not hard.

17th, First inoculation advancing, the redness and hardness around the vesicle being now very considerable.

From the second inoculation a small vesicle is formed with a central depression; but as yet there is no areola observable.

The third inoculation is merely a red speck, without any hardness.

18th, The areola of the first inoculation is still very distinct and large, and the vesicle increasing.

The vesicle of the second inoculation is very small, but distinct; and an areola was formed around

around it in the course of the night, which is now also very distinct.

The third inoculation is felt a little hard, and appears red, but there is no vesication nor areola to be perceived.

19th, The areola of the first inoculation is much faded, and the central crust is much increased.

The vesicle of the second inoculation is very distinct; and there is a beautiful ring areola around it, in size equal to a sixpence, and very hard.

The third inoculation appears more red than yesterday, and a small vesicle, or rather tumor, is formed on the part punctured, but no areola can be observed.

20th, In the first inoculation the central crust is increasing, and the areola has nearly disappeared.

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In the second inoculation, the vesicle is elevated and distinct, and the central crust is increasing. The areola has also nearly disappeared.

In the third inoculation a small areola is said to have been very distinctly observed last night, but it is now altogether gone.

This child was observed to be more fretful than usual during the two preceding nights, but was neither hot nor thirsty.

21st, The vesicle of the first inoculation nearly dried into a crust. Areola quite gone. The vesicles of the second and third inoculations are also much shrivelled, and the inflammation altogether gone.

SEVENTH CASE.

G. C. was inoculated for cowpox on the 15th
December.

December. The infection took place ; and on the 23d the vesicle was quite characteristic, but no areola had then appeared. He was then inoculated in the right arm with virus that had been kept four days, and also, in another part of the same arm, with virus from the vesicle on the left arm.

25th, An areola was very distinct around the first vesicle yesterday at noon, and this day it appears very complete. Both secondary punctures appear a little inflamed, but no hardness is felt in them.

27th, The areola of the first inoculation is quite gone, and the vesicle drying fast into a crust. Both secondary punctures felt a little hard yesterday and this day ; but the redness is now entirely gone, and very slight hardness only remains.

EIGHTH CASE.

J. J. was inoculated by two punctures on the left arm on the 20th January. Into the upper puncture was inserted fluid virus, and into the lower one a solution of a small piece of crust, which had been kept about six weeks. Different lancets were used for these operations.

25th January, Both punctures have taken effect, and the upper one seems rather the farthest advanced. Virus taken from the lower vesicle was this day inserted into the right arm.

27th, An areola began to form around each of the primary punctures this morning, and they appear now to be equally advanced, and are both quite characteristic of cowpox. The part where the second inoculation was performed feels hard, and is a little elevated, but there is as yet no areola.

28th,

28th, The areola of the two primary vesicles is complete, and the vesicles advance regularly. On examining the second inoculation with a glass, a beautiful small vesicle is seen, which is quite characteristic of cowpox. An areola began to appear around this second vesicle this morning, and is now (at three, P. M.) in size equal to a sixpence, and very complete; the whole exhibiting a beautiful miniature of a primary affection. The child has been a little fretful, but neither hot nor flushed.

30th, The vesicles of the first inoculation are drying up fast, and the areola of each is greatly faded.

The vesicle of the second inoculation is very distinct, and the areola continued very red and hard during yesterday, and until this morning; it is now evidently declining.

February 1st, All the vesicles are completely dried, and all inflammation is entirely gone. The crust formed upon the secondary vesicle was this day so
loose

loose as to be easily removed, and left the part underneath quite whole.

In this case, the areola of each of the vesicles of the first inoculation began to appear about forty hours after the second inoculation was performed, and the areola of the secondary vesicle began to appear during the third day from inoculation, and about twenty-four hours after those of the primary vesicles. The first inoculation ran its course in eleven days, the second in six; the latter was therefore accelerated five days, and the vesicle and areola of the second inoculation were for two days distinctly marked with all the characters of cowpox.

NINTH CASE.

J. D. of a very feeble and delicate constitution, was inoculated five days since with the virus of cowpox: and this day, 11th January, was reinoculated

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ed in the other arm with virus, which had been kept some days.

14th, The first inoculation advances very slowly, owing, perhaps, to the vesicle having been rubbed, and having discharged much fluid two days ago. No appearance of areola.

The second inoculation has failed. He was re-inoculated with virus from the first vesicle.

15th, Some redness appears around the vesicle of the first inoculation, but no hardness is perceptible. Vesicle looks well. The last made puncture appears red.

16th, The areola of the first inoculation is still very faint; but there is now some hardness to be felt.

The last inoculation is considerably advanced, and there is a faint redness around it. The child has been very hot and restless for two days past.

17th,

17th, The vesicle of the first inoculation is now advancing well, and the areola is very complete. The last inoculation is still more advanced than yesterday, and has a completely formed areola. The child has been much better since yesterday, and two teeth have made their appearance through the gums.

18th, The first inoculation is much the same in appearance as yesterday.

The last inoculation has a most beautiful ring areola, and there is considerable hardness around the vesicle.

20th, The vesicle of the first inoculation is drying fast, and all the surrounding redness was quite gone this morning.

The vesicle of the last inoculation is very small, but quite characteristic, and the central crust is increasing. The areola is still distinct, though much faded.

21st, The affection on both arms is quite dry, and all inflammation is gone.

In this case the progress of the affection appears to have been retarded for two or three days, probably from the febrile state induced by teething, as the areola of the first inoculation did not appear until the ninth or tenth day: But after the teeth had made their appearance through the gum, the affection became better marked, and proceeded with more rapidity.

TENTH CASE.

H. S. was inoculated on the 23d January, with a solution of part of a crust which had separated from the arm of a child about six weeks before, by one puncture in the left arm—and, at a little distance from this, fluid matter was inserted by an-

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other

other puncture. These operations were performed with different lancets.

30th, Both punctures have taken effect, and there is now no perceptible difference in their appearance. Although this be the end of the seventh day from inoculation, there is no appearance of areola.

Virus taken from the vesicle produced by the fluid matter was now inserted into the right arm.

31st, Both vesicles of the first inoculation advance regularly; and there is still no perceptible difference between them. Inflammation began to appear around each vesicle in the course of the night, and the areolae are now very complete.

The second inoculation appears only a little red.

February 2d, The areolae around the vesicles of the
first

first inoculation are evidently fading. No perceptible difference between the vesicles can be observed.

There has been considerable hardness in the part of the second inoculation yesterday and this day, but no vesication nor areola have been observed.

4th, The vesicles of the first inoculation are nearly formed into the proper crusts; and the areola of each is quite gone.

The second inoculation has never advanced beyond a flight hardness in the part.

ELEVENTH, TWELFTH, AND THIRTEENTH CASES.

R. G.—H. M. and J. M. were all inoculated at the Institution; the affection in each advanced regularly, and they were all reinoculated at the end of the seventh day with recent virus. It appears, from the reports of the mothers, that an areola was
formed

formed around each of the primary punctures early on the eighth day from inoculation; and that no vesication nor areola was produced by any of the secondary punctures, but that a degree of hardness, and very slight redness, was observable in them for two days.

FOURTEENTH CASE.

J. H. was inoculated with virus of cowpox, in the left arm, on the 23d January. The infection had taken place; and, on the 29th, he was re-inoculated in the right arm with virus from the left.

30th, The first inoculation advances regularly.

The second inoculation seems to have taken effect.

February 1st, The areola of the first inoculation began to form yesterday afternoon, and is advancing well, but is rather more late than was expected.

The

The Second inoculation is a little red and hard, but no areola appears.

2d, The areola of the first inoculation is evidently declining.

A considerable degree of inflammation is said to have been observed around the part of the second inoculation last night and this morning, but it is now entirely gone.

4th, The vesicle of the first inoculation is formed into the proper crust.

The second puncture is still somewhat hard, but no more inflammation has been observed, and no vesication seems to have taken place. The child was very hot and restless during the two preceding nights.

From these, and a great many other cases in which the second inoculation was performed at different periods

periods of the primary affection, it is concluded, that the most proper time for performing the second inoculation is about the end of the fifth or beginning of the sixth day from the first inoculation. If the second inoculation be delayed beyond the sixth day, the affection produced by it will be very indistinct, and of short duration; and, if performed at an earlier period than the fifth day, the contrast between the progress of the two affections, with regard to duration, will not be so great as may be thought necessary.

These observations, however, are applicable to those cases only in which the first inoculation advances by a perfectly regular course, and in which the areola begins to form about the end of the seventh or beginning of the eighth day; for in those cases in which the first inoculation is, from certain causes, accelerated or retarded one or two days, as frequently happens, then the second inoculation should be performed at a more early or late period accordingly.

In short, my observations on this point lead me to conclude, that, in order to obtain the proposed criterion in the greatest perfection, the second inoculation should be performed between thirty-six and forty-eight hours before the areola of the first inoculation begins to appear. This is necessary, in order that the secondary affection may have proceeded some length, and that a small vesicle containing virus may have been formed by it, before the constitutional action from the first inoculation begins, otherwise no areola, but merely a slight degree of hardness, will take place from the second puncture.

As, on the one hand, the acceleration of the second inoculation in the manner above mentioned is to be regarded as a certain mark of a constitutional affection in cowpox, so, on the other, if it shall be found that no such acceleration takes place, but that the second inoculation proceeds through all the stages, and has the duration of a primary affection, it is to be concluded, that no constitutional action has taken place from the first insertion of the virus ;

rus ; and when this is the case, the second inoculation must be regarded as a primary affection, and a third puncture be made according to the plan laid down for conducting the second inoculation ; and thus we may go on until the proper test be obtained, or until we be satisfied that the constitution completely resists the action of cowpox.

When I first laid an account of this test of a constitutional affection before my medical friends for their opinion, it was supposed by some of them, that the areola formed in the second inoculation might be merely accidental ; that it might be occasioned by any febrile affection, whereby the absorption of the virus from the vesicle was promoted, and, consequently, that this acceleration of the second inoculation might take place independently of any specific action excited in the constitution by the virus of cowpox. Although this supposition appeared to me improbable, because when any febrile affection had occurred in children under inoculation,

lation, as from teething, &c. I had constantly observed, that the progress of the local affection was rather retarded than accelerated ; yet as this was a circumstance of much importance to be ascertained, it was determined to make observations respecting it ; and for this purpose the following opportunities lately occurred.

My friend Mr A. Gillespie was called to visit a child very ill from confluent smallpox : he found another child in the same family who had neither been infected with the smallpox nor the cowpox ; this child he immediately inoculated with the cowpox : the ailment advanced regularly, and he completely resisted the contagion of the smallpox, although he was constantly in the house with his brother during the whole of his illness. A few days afterwards, another child living in the same house, but not of the same family, was brought to Mr Gillespie, when visiting the above patients, to know what was proper to be done to prepare him for the

D d

smallpox,

smallpox, or to prevent that disease if possible ; Mr Gillespie advised the immediate inoculation for cowpox, intimating, at the same time, that as the child had certainly been exposed to the infection of smallpox, there was some chance that the disease in him could not be prevented. The inoculation was accordingly performed on the left arm on the 15th of March. The infection took place, and the symptoms advanced regularly, though slowly. On the 21st, he was reinoculated in the other arm. On the 23d, the first inoculation continued to advance slowly, and the second inoculation showed every appearance of having taken effect : but as yet there was no areola observed around either of the vesicles. On the 24th in the morning, the child was observed to be very hot and feverish, and continued so during the whole of next day ; in the course of which several spots appeared over his body similar to an eruption of smallpox. On the 26th, the fever had disappeared, the child being quite cool and hearty, and the eruption was more distinct and evidently

dently that of smallpox. In the course of this day, and not before, an areola of considerable extent formed around the vesicle of the first inoculation, and one, much smaller but quite distinct, was also observed around the vesicle of the second inoculation. Thus it appears, that the smart fever of smallpox, which continued at least two complete days, had no effect in producing the areola around the cowpox vesicles, although one of them had advanced nine days, and the other three days, before that fever supervened; but as soon as the fever of smallpox disappeared, an areola was formed around each. These areolae continued evident for two days; and then both vesicles gradually dried into the proper crusts. The pustules of the smallpox were distinct, and the child was soon quite well.

Another child, living in the same house, and who had also been exposed to the same source of smallpox infection, was also inoculated by Mr Gillespie with cowpox on the 21st; the inoculation ad-

vanced

vanced regularly ; and on the 26th the child became hot and feverish, and continued so for three days, during which, although a vesicle had been formed from the cowpox inoculation, yet no appearance of areola could be observed around it. On the 29th, an eruption of smallpox appeared which was favourable ; and the child was soon after quite free from fever. On the 31st, and not before, an areola was observed around the cowpox vesicle ; and on the 1st of April, the appearance of the inoculated affection was quite characteristic of cowpox at the height. Within the areola of the cowpox affection several pustules of smallpox were observed, which advanced regularly to suppuration*.

These cases prove, that it is not every fever which will accelerate the formation of the areola in the cowpox affection ; and from them it would appear, that the action excited in the constitution by the
virus

* Mr Gillespie very politely afforded me frequent opportunities of examining the progress of the symptoms in both these children.

virus of cowpox, and the contagion of smallpox, is different : They also give additional cause for believing that the acceleration of the secondary inoculation to maturity is the effect of a specific action in the constitution, which can be no other than that excited by the virus of cowpox, and, consequently, that this acceleration of the second inoculation may be relied on as a sufficient test of a general or constitutional affection.

I have thus described a mode of obtaining such a test of a constitutional affection in cowpox, as, I trust, will be found effectual : and it is hoped that this description has been given in such a manner as both to induce and enable others to follow the plan proposed. The grounds upon which the criterion itself is founded, the ease with which it may at all times be put in practice, the success with which it has hitherto been attended, and, above all, the satisfaction arising from being assured of the important point it is meant to ascertain, will ensure it farther trials ;

trials ; of the success of which I can at present see no reasonable cause of doubt. It is, therefore, to be wished, that this criterion may soon be generally practised as an improvement of much importance in conducting the inoculation of cowpox, as at once giving confidence in the extent of the ailment, and precluding all necessity for inoculation with the virus of smallpox afterwards.

EXPLANATION

EXPLANATION

OF THE

PLATES.

 PLATE I.

THIS plate represents the progress of the cowpox affection, on four different days, as it appeared on the arms of a child in whom the double inoculation was performed. The child from whom the drawings were made was of a delicate habit, and in him the progress of the cowpox affection was protracted

tracted at least two days beyond the usual period. From this circumstance the second inoculation was not performed until the seventh day.

The figures in the left hand column represent the appearance of the vesicle and areola of the first inoculation on the tenth, twelfth, thirteenth, and fifteenth days; and the figures in the right hand column represent the appearance of the vesicle and areola of the second inoculation on the same days, which correspond with the third, fifth, sixth, and eighth days from the time the second operation was performed. Thus, on the tenth day of the first inoculation, which corresponds with the third day of the second inoculation, the first set of drawings was made, showing the affection on both arms to be advancing. On the twelfth day of the first inoculation, and on the fifth day of the second inoculation, the next set of drawings was made, which represents both affections about the height. On the thirteenth day of the first inoculation, and the sixth

sixth day of the second inoculation, the third set of drawings was made, showing the affection in both arms to be evidently on the decline. On the fifteenth day of the first inoculation, which corresponds with the eighth day of the second inoculation, the last set of drawings was made, which exhibit the affection on both arms very much faded, and the vesicles nearly dried into the proper crusts. In this case, the affection produced by the first inoculation completed its course in fifteen days, and the affection produced by the second inoculation completed its course in eight days.

In this case a beautiful ring areola was observed around the secondary vesicles for two days; but at no period, in the course of the affection, did the areola of the primary vesicle assume that appearance.

PLATE II.

THIS plate represents the progress of the affection of cowpox in another child, in whom the double inoculation was performed. In this case, the affection advanced regularly; and the second inoculation was performed on the beginning of the sixth day. The first two figures on a line represent the appearance of the vesicles of the first and second inoculation on the ninth and fourth days from the time of inserting the virus into each respectively; at which time both vesicles were advancing to maturity. The next two figures on a line represent the appearance of the affection on each arm, on the tenth day from the first inoculation, and fifth day from the second inoculation, at which time the areolae were fully formed, and the affection at its height in both arms. The last two figures

figures on a line, in this plate, represent the appearance of the affection on both arms on the twelfth and seventh days from the time of their respective inoculations. At this time, the surrounding inflammation was greatly gone from both vesicles, and these were drying fast into the proper crusts.

PLATE III.

FIG. 1. and 2. represent the appearance of the cowpox vesicle at the end of the fifth day, when the progress is regular. These show the appearance of the primary affection at the period when it is most proper to perform the second inoculation, in order to obtain the proposed test of a constitutional affection in the most perfect state; and, by comparing these figures with the vesicles of the second inoculation on the fifth day, as delineated in plates I. and II. an estimation may be made of the degree

degree of acceleration, which is occasioned in the progress of the vesicle of the second inoculation by the presence of the constitutional affection.

Fig. 1. represents the appearance of the cowpox vesicle, at the period above mentioned, when the inoculation is performed by a puncture.

Fig. 2. represents the appearance of the cowpox vesicle, at the same period, when the inoculation is performed by incision.

Fig. 3. represents the appearance of the local affection produced by the inoculation of smallpox on the eighth day after the virus had been inserted.

Fig. 4. represents the affection produced by the inoculation of smallpox on the twelfth day after the virus had been inserted.

By

By contrasting these last figures, namely fig. 3. and fig. 4. with the primary vesicles of cowpox about the period of their height, such a difference is easily perceived as to justify us in regarding the cowpox and the smallpox as totally different affections.

CHAP.



10th Day



12 Day



13 Day



15 Day

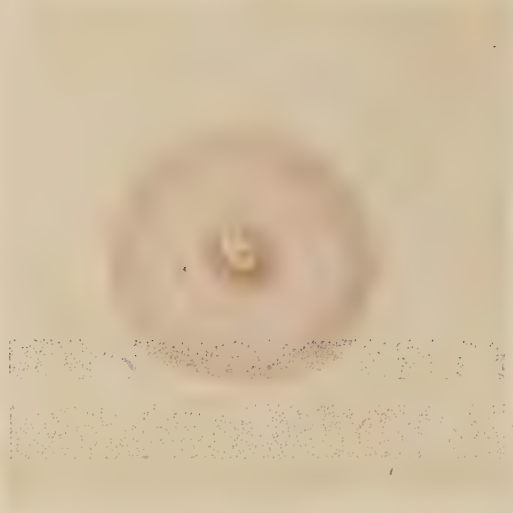


Vesicles of the 1st Inoculation.

3rd Day



5 Day



6 Day



8 Day



Vesicles of the 2nd Inoculation.



Fig. 2.

Vesicles of the 1st inoculation.



Fig. 3.

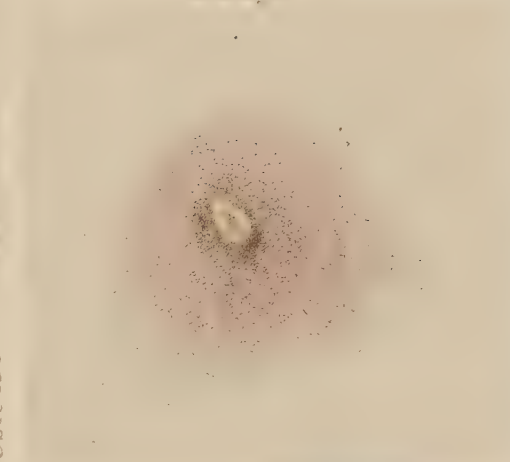


Fig. 4.

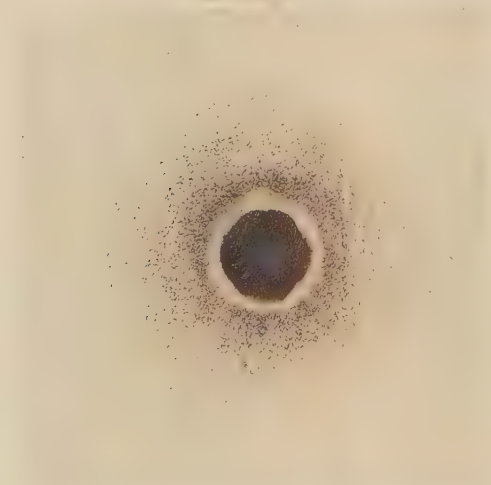
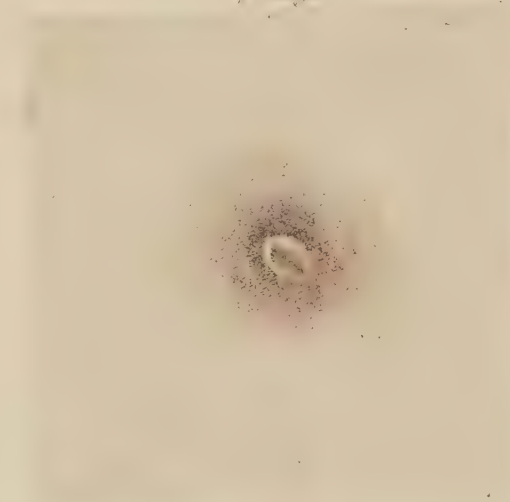


Fig. 5.



C H A P. IV.

OF THE MEDICAL TREATMENT OF COWPOX.

FROM what has been said in the preceding pages, concerning the nature of cowpox, it will appear that little is necessary to be done in the treatment of such a mild affection. In smallpox, it has generally been recommended, that the person should undergo some preparation by medicine before inoculation is performed. In cowpox, this is quite

quite unnecessary. As we find, however, that certain deviations from the regular appearance of the affection do sometimes take place, and as these deviations are frequently such as to defeat the purpose of the inoculation, it becomes of much importance to prevent them. Again, although the cowpox is, in ninety-nine cases out of a hundred, or perhaps in a much greater proportion, so mild as not to deserve the name of a disease, yet, occasionally, cases occur in which the symptoms both of the local and of the general affection are more severe than is necessary, and such severity of symptoms it will always be proper to moderate.

These considerations present us with the two following indications in the medical treatment of cowpox.

- I. To prevent any irregularity in the course of the local affection.

II. To moderate the symptoms both in the local and in the constitutional affection, should these prove more severe than is necessary.

It has already been observed, in a former part of this Essay, that, from various causes, the inoculated vesicle may be broken, and the contents effused at such periods in the progress of the affection as may either altogether prevent the success of the operation, or afterwards prove troublesome by producing obstinate sores. When the vesicle discharges its contents before the areola is formed, that is, before the seventh day, and especially if a constant oozing follow, no constitutional operation, preventive of smallpox, can be expected to take place. The utmost care is therefore necessary to prevent such an accident. This may in general be done by avoiding the friction of the clothes upon the vesicle. It is also necessary to prevent the person from picking or scratching the part, and this requires some attention on

the part of the attendants, as considerable itching is commonly felt during the first stages of the ailment. But should unfortunately the vesicle be already broken and be discharging its contents, then remedies must immediately be applied in order to check the farther effusion of the fluid. For this purpose it will frequently be sufficient to keep cloths, which have been previously dipped in cold water, upon the part for some time; renewing these occasionally, in order that the astringent power of cold may be applied in full force. When this is insufficient for the purpose, recourse must be had to some more powerful astringent, and, as such, the diluted vitriolic acid, and the acetite of lead, are both very efficacious. A single drop of either of these fluids is to be put upon the vesicle, where broken, with the point of a probe, and suffered to remain for one or two minutes, and then, cloths dipped in cold water may be applied as already recommended; by these means the discharge will be stopped, and the course of the affection will again become regular.

When

When the vesicle discharges its contents at a more late period of the affection, whether from a particular disposition in the part, or from the central crust, which is very easily detached at any time between the ninth and twelfth day, being forcibly removed, and the whole seems inclined to degenerate, or has already degenerated, into a foul and troublesome sore, with an ichorous discharge, so acrid as to occasion a scaly eruption upon the neighbouring parts, recourse must still be had to strong astringent and to escharotic applications. Besides those already mentioned, an ointment formed of the red oxyd of mercury, with simple cerate, will be found a remedy of particular efficacy in this state of the affection. If the inflamed and hardened areola has been observed, the healing of the sore should be effected as soon as possible, without attending to the formation of the semi-transparent crust, in which the ailment generally terminates. But, if the inflamed and hardened areola, or other marks of a constitutional affection have not
been

been observed, then the operation must be regarded as having failed, and the inoculation is to be repeated.

In delicate and weakly children, in whom there seems little tendency to inflammation and absorption, and in whom, consequently, the contents of the vesicle may be dried into a crust without entering the circulating system, (instances of which, I suppose to take place in those cases where the proper, or a semitransparent crust, is formed about the eighth day without the appearance of areola,) it is of much advantage to apply some stimulant application to the part in order to induce absorption; and one of the most powerful and best adapted for this purpose is heat. Let the part be moderately warmed before the fire, two or three times in the day, and afterwards covered with cotton. This I have frequently ordered, and seen used with good effect.

II. The second indication is to moderate the symptoms both in the local and in the constitutional affection, should these prove more severe than is necessary.

The only symptom in the local affection, which can require to be moderated, is the inflammation. Some cases are mentioned by authors, in which this symptom has proceeded to an alarming degree. These, however, are very uncommon ; and it appears to me, that their cause has, in general, been such as may be easily avoided ; I mean the making a great many punctures near each other. From this circumstance, it will occur to every one, that not only the inflammation must be much increased, seeing each puncture produces a vesicle with an areola, but also that the accompanying general affection must also be made more severe. To avoid this cause of severe inflammation, I have recommended, that only one puncture be made, at least in one arm ; and that this should rather be repeated,
if

if it has failed, than the patient be exposed to the danger of a severe local affection; and I have the satisfaction of stating, that, from attending to this rule, neither Dr Farquharson nor myself have ever seen an instance, among all those cases which have fallen under our care, in which the application of remedies, from an excess of inflammation, was required. Such, however, have been related by others; and the following mode of treatment has been recommended.

“ About the tenth or eleventh day,” says Dr Jenner, “ if the pustule has proceeded regularly, the appearance of the arm will almost to a certainty indicate whether this,” viz. a degree of inflammation greater than what may appear necessary, “ is to be expected or not. Should it happen, nothing more need be done than to apply a single drop of the aq. lithargyr. acetat. upon the pustule; and having suffered it to remain there two or three minutes, to cover the efflorescence surrounding the pustule, with

a piece of linen dipped in the aq. lithargyr. compos. The former may be repeated twice or three times a-day ; the latter as often as it may feel agreeable to the patient *.” The application of strong mercurial ointment to the part inflamed has also been used with advantage, to moderate this symptom.

The affection of the axillary glands is seldom or never so great as to require medical assistance. Should it so happen, however, that considerable inflammation does affect them, cloths wetted with the aq. lithargyr. compos. and kept constantly applied, will be found a very efficacious remedy. Should a true erysipelas attack the arm during the course of the cowpox affection, it must be considered as a separate disease, and treated accordingly.

In children, the symptoms of fever, denoting a constitutional affection, are in general so slight as to
escape

* Vide Continuation of Facts and Observations, &c. p. 36.

escape notice. In those more advanced in life, however, a considerable degree of fever is more common: When this takes place, attention to the state of the bowels, and giving once or twice a cooling purgative, is all that I have ever found necessary: cool air and abundance of cooling drinks are also highly proper.

Disturbed sleep, with dreaming and frequent startings, are common in all fevers; but as occurring in the constitutional affection of cowpox, they have been thought, especially the latter, to be the forerunners of such fits as frequently take place before the eruption of smallpox. It has never happened to me to see fits induced by the inoculation, or the constitutional affection of cowpox; such cases, however, have been related to me by practitioners, in whose accuracy I have entire confidence: And certainly, judging from what we know of the human constitution, we cannot wonder if, under certain circumstances, these should occur in persons
under

under the influence of cowpox. It is well known, that a morbid irritability is the great predisposing cause of such fits; and, therefore, not only inoculation with cowpox should be avoided at those periods of life when great irritability prevails, as during the very early periods of infancy, and during the time of teething; but also every thing should be avoided during the course of the ailment which may be supposed to induce or increase this irritable state. When the symptoms above mentioned, as the supposed forerunners of convulsion fits, occur, they will be best removed by a proper attention to the state of the bowels, by keeping the person perfectly quiet, and by a free exposure to cool air.

I have thus finished those practical remarks on conducting the inoculation of cowpox which my experience in that ailment has enabled me to make, and which I thought it my duty, as one of the surgeons to the Institution for the Gratuitous Inoculation of Cowpox, to lay before the

public. If they shall be found to contain matter worthy of notice, and especially if they shall contribute to forward the great cause, the general inoculation of cowpox, and, consequently, the final extinction of smallpox, my object will be fully accomplished : For what can afford more real satisfaction than the assurance of being accessary to the preservation of the lives, and to the alleviation of the sufferings of our fellow creatures ?

To those endowed with thinking minds, and with feeling hearts, I should deem it an insult to insist farther on the propriety of their giving every encouragement, both by example and by precept, to the general practice of the new inoculation, after what has been mentioned respecting the advantages which will accrue to society by the substitution of the inoculation of cowpox for that of smallpox :—But I well know, that there are amongst us, who either do not give themselves the trouble to think, even upon matters which so nearly concern their own happiness,

happinefs, or, if they do think, their reasoning is like that of fools: “ Our forefathers,” fay they, “ have had fmallpox, and have done well; we alfo have had fmallpox, and have done well! Why fhould not our children alfo be led in the fame path? Why fhould we make innovations? Why truft ourfelves out of the beaten tract pointed out by our anceftors?” For fuch perfons, I here record the hiftory of an unfortunate family, which is given me on the beft authority, and to which I earneftly follicit their moft ferious attention. “ At ——— lately occurred a melancholy hiftory, but highly favourable to the inoculation of cowpox. A woman, named ——— had five children; thefe fhe had determined to inoculate with cowpox. The operation was already performed upon two; and at that instant fhe was informed, and convinced, that it would anfwer no good purpofe, as they would afterwards take the natural fmallpox: on this account three of the children were not inoculated with the
cowpox.

cowpox. The two who were inoculated had the usual symptoms of cowpox. Some time afterwards the smallpox came; the three who had not undergone the cowpox were infected, *and one died*; and although the other two who had the cowpox slept in the same beds with those loaded with the natural smallpox, yet have they entirely resisted the attacks of this dreadful disease."

• I N I S •

ALEX. SMELLIE, Printer, Anchor Close.

